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GUNDLACH'S WORK ON THE ODONATA OF CUBA: A CRITICAL STUDY

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(With Plates XXXIII, XXXIV and XXXV)

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INTRODUCTION: THE PUBLICATION, DISTRIBUTION AND GENERAL CHARACTERISTICS OF GUNDLACH'S WORK ON THE ODONATA OF CUBA

On April 26, 1913, the library of the American Entomological Society acquired a copy of Tomo II of the *Contribución a la Entomología Cubana* by Juan Gundlach. On examining this volume shortly after, I became aware for the first time of the existence of a fairly extensive work on the Odonata of Cuba which, to the best of my knowledge, has never been quoted by any writer on this group of insects except by Gundlach himself. In his *Apuntes para la Fauna Puerto-Riqueña, Octava Parte* (Anales Soc. Españ. Hist. Nat., Serie II, Tomo 2, pp. 259-344, 31 Enero, 1894), he states: "En el mismo año 1888 empezó la publicación mía sobre los Neurópteros de la Isla de Cuba en el tomo II de mi *Contribución a la Fauna cubana, Entomología* (1)." The

corresponding footnote (1) reads "Se publicó y se publica aún, en pliegos mensuales especiales, como parte de los *Anales de la Academia de Ciencias médicas, físicas y naturales de la Habana*. . . . De la Entomología contiene el tomo II los Himenópteros, Neurópteros y Ortópteros. El tomo III principió con los Coleópteros." In these *Apuntes* the Odonata of Puerto Rico are listed without descriptions or citations of localities, but with references to literature under each species, including page references to his *Contribución*.

Neither the Catalogue of Odonata by Kirby nor that of North American species by Muttkowsky quotes Gundlach's *Contribución*, nor is any reference to it to be found in the extensive bibliographical citations under each species in the great work of Ris on the Libellulinae.¹ Since it has thus remained unknown for so long a period, it seems desirable that it be brought to the attention of entomologists. I have, from time to time, as opportunity permitted, studied its text critically with the aid of chiefly Cuban specimens and the present paper contains my results.

The full title of the copy in the possession of the American Entomological Society is | Contribucion | a la | Entomologia Cubana, | Tomo II. | Habana. | Imp. "La Antilla," de Cacho-Negrete, | Calle de Zulueta numero 73. | 1886. | It consists of 281+viii+v pages, of which pp. 5-187+viii are concerned with Hymenoptera, pp. 189-281+i-v with Neuroptera. The type-form of the pages measures 18×10.5 cm. There are no illustrations.

This copy is incomplete, as is evidenced from the statement of the contents of Tomo II by Gundlach in 1894, quoted above, and by the citation by Scudder in his *Alphabetical Index to North American Orthoptera described in the Eighteenth and Nineteenth Centuries*.² "Gundlach, Juan. Contribución a la Entomología Cubana. Tomo II. Habana, 1886, 1891. 8o. (Parte cuarta, Ortópteros, pp. 287-396 was issued in 1890 and 1891.)"

It will be noted that the title-page of Tomo II of the *Contribución* is dated 1886. Gundlach's statement of 1894 mentions its publication in the *Anales* of the Havana Academy. On referring to the *Anales*, I find the following: "Índice de las Materias contenidas en el Tomo XXIV. . . . Nota.—Con la presenta

¹ Cat. Colls. Zool. Selys.

² Boston Soc. Nat. Hist., 1901, p. 364.

entrega concluye el tomo XXIV de los Anales y comienza en pliego separado la publicación de la parte tercera de la Entomología que trata de los *Neurópteros* de la Isla de Cuba por el *Dr. Gundlach*." The title-page of this Tomo XXIV is dated Habana . . . 1887, but this volume contains (pp. 589 et seq.) communications of the "Sesión del 13 de Mayo de 1888." Similarly: "Indice de las Materias contenidas en el Tomo XXV. . . . Nota.—Con la presente entrega concluye el tomo XXV de los Anales y sigue en pliego separado la publicación de la parte tercera de la Entomología que trata de los *Neurópteros* de la Isla de Cuba por El *Dr. Gundlach*." The title-page of Tomo XXV is dated Habana . . . 1888, but the volume contains (pp. 881 et seq.) the proceedings of the "Sesión publica ordinaria del 24 de Marzo de 1889" which, moreover, are entered in the "Indice" for this volume, p. vi.

The method of publication of the "entregas" and "pliegos" has been cleared up by a letter which I owe to the kindness of Dr. Charles T. Ramsden,³ of Guantanamo, Cuba, dated October 14, 1916, from which the following is taken:

In the first place I must make certain things clear: The Academic year begins on the 19th of May, and lasts till the same day of the following year, for this reason you will note that the Vols. cover two calendar years. The reason for this is that the Academy was founded on the 19th of May. The result is that all communications up to the 13th of May, 1888 (this being the date of the last meeting of that Academic year), appear in the Proceedings, Vol. XXIV, 1887; for the same reason Vol. XXV, 1888, contains communications sent in during the first months of 1889.

I should also inform you that Gundlach's publications were written very slowly, and at times with long interruptions, as he did not live at Havana, but at the sugar estate "La Fermina"; and when opportunity offered went on his collecting trips about the Island, as also to Porto Rico. With each number of the Anales appeared a "pliego" of eight pages of Gundlach's "Contribuciones"; there were twelve numbers each year, these numbers were called "Entregas."

The Parte II, Vol. II of Gundlach's "Contribución á la Entomología Cubana" contains the Hymenoptera; this Vol. II was begun in 1886 and ended in 1891; the Parte II is composed of 24½ "Pliegos," the last of which

³ To Dr. Ramsden the scientific world is indebted for a highly interesting biographical account of Gundlach in Ent. News, xxvi, pp. 241-260, June, 1915, and subsequently in a Spanish version *Vida y Exploraciones Zoológicas del Dr. Juan Gundlach en Cuba (1839-1896)* in *Memorias de la Sociedad Cubana de Hist. Nat.* "Felipe Poey," iii, nums. 4-6, pp. 146-168, 1918. Both versions are accompanied by the same two portraits.

is marked at the bottom No. 25 and contains the last pages of the index of the Hymenoptera and the first two pages (191 and 192) of Parte III—Neuroptera; this was published in May, 1888. So we have:—

Parte III.

Pliego 25—pages 191, 192—published in May 1888, Vol. XXV

do. 26	do. 193–200	do.	June 1888	do.
do. 27	do. 201–208	do.	July 1888	do.
do. 28	do. 209–216	do.	Aug. 1888	do.
do. 29	do. 217–224	do.	Sept. 1888	do.
do. 30	do. 225–232	do.	Oct. 1888	do.
do. 31	do. 233–240	do.	Nov. 1888	do.
do. 32	do. 241–248	do.	Dec. 1888	do.
do. 33	do. 249–256	do.	Feb. 1889	do.
do. 34	do. 257–264	do.	Mar. 1889	do.
do. 35	do. 265–272	do.	June 1889, Vol. XXVI	
do. 36	do. 273–280	do.	Nov. 1889	do.
do. 37	do. 281, i–v ended		Mar. 1890	do.

Parte IV, Orthoptera, takes in “pliegos” 38–49 and an Appendix also marked No. 49 by error; this Parte IV was begun in April, 1890, and continued without interruption from June, 1890, to May, 1891, upon which date ended Vol. II of Gundlach’s “Contribución á la Entomología Cubana,” at the same time commencing Vol. III with Parte V, Coleoptera.

Mr. Herbert Campion, who has given me some information concerning a copy of the *Anales* of the Havana Academy and of Gundlach’s *Contribución* in the library of the British Museum of Natural History, has also sent me a list of dates of publication of the “pliegos” which agrees with that quoted above from Dr. Ramsden’s letter except that he gives the date in each case as the 15th of each month (Aug. 15, 1888, Sept. 15, 1888, etc.).⁴

When and to what extent copies of the *Anales* and of Gundlach’s *Contribución* in separate form were distributed is difficult to determine. Mr. Rolla P. Currie wrote me from the United States Department of Agriculture on May 9, 1919: “With regard to Volume II of Juan Gundlach’s *Contribución á la Entomología Cubana*, the date of receipt on the title page of this volume, and also on page 217, is February 29, 1892. Miss Barnett and Miss Hawks of the Department Library, however, state that this date is not necessarily significant, as at that time the copies were not always dated when first received, or the copy may have been purchased some time after it was published.”

⁴ I am indebted to Mr. Nathan Banks for calling my attention to Mr. E. A. Schwarz’s note, on the catalogue of Gundlach’s collection, and on the dating of Gundlach’s works, in Proc. Ent. Soc. Washington, vii, 1–2, 1905.

Mr. Herbert Campion, writing on May 4, 1919, says: "As regards Gundlach, the library at the British Museum (Natural History) includes a copy of the *Anales*, as well as a copy of the *Contribución*. The parts were not received periodically, as they were issued, but a set was purchased on 24th October, 1899. The *Contribución* is bound separately, and the title-page of Vol. II bears the date 1886 as part of its contents. Vols. XXV and XXVI of the *Anales* are bound up in their original green paper covers. The first page of each cover gives the date of publication and the fourth page an indice, which refers, not only to the entrega itself, but also to the pliego aparte issued with it, whenever one was included. It is quite easy, therefore, to associate every pliego or sheet of the *Contribución* with the particular entrega of the *Anales* with which it appeared, . . ."

I have found no reference to Gundlach's *Contribución* on the Neuroptera, either as "pliegos" of the Havana *Anales* or as a separate work, in the Zoological Record⁵ or in the Jahresberichte of the Archiv für Naturgeschichte from 1888 on. Gundlach was elected a member of the Sociedad Española de Historia Natural de Madrid in 1872 or 1874 (the printed lists differ as to date), and the "Actas" in the *Anales* of this Society mention additions to the library, but, although the receipt of Tomo XXVIII, 1892, entregas 329-332, Tomo XXIX, 1892, entregas 333-337, of the *Anales* of the Havana Academy is acknowledged,⁶ I find no record of the reception of the volumes containing Gundlach's work now under discussion.

As will appear later, Gundlach's chief correspondent on the Odonata was Dr. H. A. Hagen and, up to October, 1889, it would seem that Hagen knew nothing of Gundlach's publication, as Hagen wrote to me from the Museum of Comparative Zoology, October 16, 1889, of some specimens which I had submitted to him: "No. 1 is *Lepthemis grvida* Hagen n. sp. in my coll. and from Florida. It is very near to *L. herbida* Hag. also new but printed in my Synopsis 1875, p. 74" (no description). Gundlach published the description of *herbida* on page 261 of his *Con-*

⁵ Volume One of the *Contribución*, dealing with the Lepidoptera, is quoted in the Zoological Record for 1891, Insects, pp. 25, 215.

⁶ *Anales Soc. Esp. Hist. Nat. Madrid*, xxi, Actas, p. 186, 1892.

tribución, and this page, according to the data from Dr. Ramsden and Mr. Campion, appeared on March 15, 1889.

It is quite possible that data showing earlier distribution of Gundlach's work than February 29, 1892, may be unearthed by bibliographers and the foregoing indicates the desirability of this. If we assume the listed dates of publication of the pliegos in the Havana Academy's *Anales* to be actual, a number of species described by Gundlach have priority in name over some proposed by other authors. Such, among the Odonata, are:

Lestes scalaris Gundlach, p. 216, Aug. 15, 1888, vs. *Lestes scalaris* Calvert, October 7, 1909.

Lestes (Hypolestes) trinitatis Gundlach, p. 216, Aug. 15, 1888, vs. *Ortholestes abbotti* Calvert, Jan. 30, 1894.

Hypolestes Gundlach, l. c., vs. *Ortholestes* Calvert, Dec. 2, 1891.

Libellula herbida Gundlach, p. 261, March 15, 1888, vs. *Canacra batesii* Kirby, Aug. 14, 1889.

The value of Gundlach's work on the Odonata is three-fold. It gives:

1. Precise geographical data on the distribution of species in Cuba.

2. Descriptions of body-colors made from living or freshly-killed Cuban examples.

3. Descriptions of some previously undescribed forms; these are, in addition to those just mentioned,

Agrion (Enallagma) truncatum Gundlach, p. 226, Oct. 15, 1888.

Gynacantha ereagris Gundlach, p. 243, Dec. 15, 1888.

Neither of these appears to have been described by any other author.

1. A considerable body of geographical data due to Gundlach has been available for many years in papers by Dr. Hagen.⁷ It will be noticed that those reproduced in the following pages from the *Contribución* differ in a number of species. Dr. Ramsden's biographical notices indicate the situation of and the time of collecting at some of the localities cited by Gundlach.

2. Some of Gundlach's descriptions of living colors of Cuban Odonata have also been accessible and well known in German versions published by Hagen in the *Stettiner Zeitung*, as just

⁷ Proc. Boston Soc. Nat. Hist., xi, 289-293, 1867; Stett. Ent. Zeitg., xxviii, 215-232, 1867, and xxix, 274-287, 1868.

quoted. From my studies of the *Contribución*, I think that the following notes may be usefully included here.

Gundlach appears to have had no precise idea as to the total number of abdominal segments in the Odonata. Thus, nine is the number implied in his descriptions of *Dythemis didyma*, p. 269, *D. aequalis*, p. 270, *D. debilis*, p. 272, and possibly *Mesothemis mithra*, p. 276, and *Diplax ochracea*, p. 277. Ten segments are recognized in his translations from Hagen and for *Pantala flavescens*, p. 245, and *Mesothemis simplicicollis*, p. 275. Eleven segments are mentioned for *Lestes scalaris*, p. 216, and twelve for *Lestes tenuatus*, p. 214, *Agrion* (*Enallagma*) *truncatum*, p. 226, and the female of *Dythemis frontalis*, p. 267. In many cases he refers to the last three segments, or as antepenultimate, penultimate, and last segments, from which some clue is often to be obtained as to the number which he recognized in a particular species. Comments on these numbers will be found under various species, *postea*. Where his numeration differs from that commonly recognized (10+1 anal segment), the increase is sometimes to be accounted for by his reckoning segment 2 to be two segments separated by the transverse median carina of that segment, *e. g.* *Dythemis didyma*, p. 269, although in the following species (*D. dicrota*) he does not seem to count segment 2 as if it were two segments.

Gundlach used "frente" to mean "clypeus," in some cases at least, as is well shown in his description of *Dythemis frontalis*, p. 267.

In most species, the data given by Gundlach on the dimensions and on the wings are translated from Hagen's descriptions in the *Synopsis of the Neuroptera of North America* of 1861, even where the description otherwise is original with Gundlach, although the wings of *Dythemis frontalis* are exceptions. The descriptions of new species lack measurements and data on the wings.

In many passages, Gundlach applies "pardo" (which two Spanish-English dictionaries render "grey") to parts which are luteous or pale brown in dried specimens. In the German versions in the *Stettiner Zeitung*, "pardo" is replaced by "braun."

Since the Spanish descriptions of *Pantala flavescens* and *hymenaea* in the *Contribución* correspond exactly to the German versions for these same species, one is tempted to conclude that

Gundlach did not revise his descriptions between sometime previous to 1867 and 1888; on the other hand, the Spanish and German descriptions of *Tramea marcella* differ more than by mere differences of translation.

Dr. Ramsden has kindly sent me the following information, obtained through Dr. Carlos de la Torre, respecting the existence of the types of Gundlach's new species of Odonata in the Instituto de Segunda Enseñanza at Havana. I quote from a letter of July 4, 1919:

"The specimens in the Gundlach collection are kept in small boxes, something like cigar boxes, with a glass front; this glass is held on by pasting paper all around the sides of the box and edges of the glass, thus it is impossible to repair or even to study closely any specimen; these small boxes are again placed in larger glass covered cases, several boxes to each case, the glass covers of which are screwed on." [Cf. Ent. News, xxvi, page 256.]

"The general state of the collection is satisfactory, as notwithstanding that most of the types are over 50 years old and some as much as 70 years, about 75 per cent of them are in good condition and those that have been mutilated have the pieces in the same box where they have fallen due to knocks. (I refer to the heads and abdomens.)

"The labels are like this:

104 Lestes

129 scalaris ♂

all of them written in Gundlach's own handwriting. He used to send the specimens for identification and receive the types back, so there is no doubt that the above mentioned specimens are TYPES. I must explain that in the above numeration, the top number refers to the Gundlach number, while the lower one is the number used by Poey in his own collection; this double numbering appears in all of Gundlach's catalogues and notes, whether insects or shells are being treated.

"I have given you the data on each label [of the five new species of Odonata], as also the number of specimens of each species in the cases, but in () I have stated the condition these are in, and I have also given whatever information exists in Gundlach's own MS. catalogue, so you have all the information obtainable on each species. Wherever () appear it means that what is between is not on label, nor in catalogue, but notes taken by the observer."

Dr. Ramsden's notes on the types of each of the five species are quoted in appropriate places after each species respectively in the following pages.

EXTRACTS FROM GUNDLACH'S TEXT, WITH COMMENTS

In the following pages are given the text of the Prologue to Tomo II of the *Contribución*, extracts from the Introduction to the Neuroptera, with some comments, and then the species of

Odonata enumerated and described by Gundlach. In the majority of cases, the name of the species is, as in the *Contribución*, followed by Gundlach's collecting number in parentheses (as he explains on p. 14 of his volume). To this I have added the page number of the *Contribución*, the date of publication of the respective pliego of the *Anales* of the Havana Academy and the usual name of the species at the present time. With few exceptions, I have omitted the references given by Gundlach to previous authors. His statements of the localities for each species in Cuba and in Porto Rico, but not elsewhere, have been reproduced, as well as such items of his descriptions as seem to require comment. These last are based on comparisons with specimens which, as far as possible, are those which have been quoted in the Neuroptera volume of the *Biologia Centrali-Americana*, as by this means a uniformity of specific identity with that work has been sought. These specimens, unless otherwise stated, are in the collections of the Academy of Natural Sciences of Philadelphia. Others are in the collections of the Museum of Comparative Zoology, at Cambridge, Massachusetts. To the authorities of these institutions, I am indebted for the privilege of studying their material.

ENTOMOLOGIA CUBANA. Pages 3-4

NOTAS PARA LA ENTOMOLOGÍA CUBANA, SEGUN OBSERVACIONES
PROPIAS DURANTE CUARENTA Y SEIS AÑOS.

Prologo al Tomo II.

En los seis Ordenes de Insectos que faltan que tratar, me veo obligado á cambiar el modo con el cual he redactado el Orden de los Lepidópteros, pues se conoce en muy pocos casos la transformación y las costumbres de las especies. Tampoco he querido dar, como en los Lepidópteros, una descripción corta hecha por mí en vista de los ejemplares de mi colección; sino he preferido dar la diagnosis hecha por los autores de las mismas especies, traducida al español, y solamente cuando no he podido tener la obra correspondiente, he trazado yo mismo una descripción, usando el ejemplar de mi colección. Lo mismo que en el Orden Lepidópteros, he indicado algunas particularidades observadas en las costumbres, sea de las familias, géneros ó especies. He indicado

también en la mayor parte de las especies dónde las he encontrado, sea la localidad en particular, ó las partes occidental y oriental de la Isla en general. Asimismo he anotado la sinonimia esencial, principalmente la de los autores que han escrito algo sobre las especies cubanas, incluyendo también los que trataron de la fauna portorriqueña. (He publicado y se publican aún mis Apuntes sobre la fauna de esa isla hermana en los Anales de la Sociedad Española de Historia Natural de Madrid.) Casi nunca he podido indicar si una especie es común ó rara, pues esto depende del tiempo, de la localidad etc., en la cual se observa, y también de las circunstancias más ó ménos favorables para los primeros estados de la transformación del insecto. Así puede una especie ser rara en una localidad de la isla y en otra común. Unas especies se encuentran en todos tiempos del año, mientras otras vuelan solamente en ciertas épocas.

Introducción al Orden Tercero. [Neurópteros]. Pages 191 et seq.

He cogido pocas especies de los verdaderos Neurópteros y estas mismas han quedado casi todas sin clasificación por falta de la literatura necesaria ó sea tratado especial ó por falta de un naturalista que quisiera estudiar y clasificar las especies cubanas como el Sr. Poey y yo juntos tuvimos la fortuna de hacerlo para la familia Odonata de los Pseudoneuroptera, que fué clasificada y en parte descrita por el Doctor Hermann Hagen en Königsberg (Alemania), hoy empleado en el Museo de Zoología comparada en Cambridge (Massachussets).

* * * * *

La primera obra que trata en particular sobre especies cubanas es la obra de Ramón de la Sagra, para la cual ha redactado Mr. de Selys-Longchamps los Neurópteros, recogidos y comunicados casi todos por el Sr. Poey á la Sagra. La segunda es la que publicó el Instituto Smithsoniano de Washington, preparada por el Dr. Hermann Hagen en 1861, cuyo título es "Synopsis of the Neuroptera of North America," y en el cual incluye las especies de las Antillas. He usado esta obra para muchas descripciones y para la sinonimia.—Después publicó Mr. Samuel Hublard [sic] Scudder en Proceedings of the Boston Society of Natural History Vol. X, 1866, p. 187, un artículo sobre Odonata de la Isla de Pinos y describe diez y seis especies, de ellas cinco como nuevas,

pero el Doctor Hagen reconoció en estas especies las descritas anteriormente; pero Mr. Scudder en su Proceedings XI, 1867, p. 298 establece sobre la materia algunas dudas.

Habiendo yo redactado descripciones del colorido de especies aun vivas (pues después de ser matadas pierden mucho de su hermosura), las comuniqué al Dr. Hagen, quien las creyó útiles para la publicación que se efectuó en gran parte en las páginas 215-232 y 274-287 del tomo XXVIII [y XXIX] de Berliner [error for Stettiner] Entomologische Zeitung 1867 [y 1868].

Para no poner en cada especie el titulo de las obras citadas, he usado las abreviaturas siguientes: . . .

The list which follows contains thirty-eight titles. The latest is "Selys Longchamps Revue de Syn. Agriòn"; although Gundlach does not give the date here, he correctly quotes it as 1886 on p. 220. The only item in this list which is unfamiliar in Odonate literature is "Selys Cub.—De Selys Longchamps. Neurópteros de la Isla de Cuba en la edición española de la obra de la Sagra 'Historia física, política, y natural de la Isla de Cuba, tomo VII, 1865.'" This is presumably the Spanish edition cited by Hagen in his Synopsis of 1861, p. xv, and in his Bibliotheca Entomologica, II, p. 101; in the first citation he gives the date as 1857, in the second as 1856, but adds: "Erschien nach Gerstaecker wohl erst 1857." It will be observed that Gundlach dates it 1865 and in listing Guérin's work in the same Tomo VII of Sagra, in his bibliography for Hymenoptera, p. 9 of this present volume, he likewise quotes it as of 1865. In his *Apuntes para la fauna Puerto-Riqueña*,⁸ however, Gundlach gives the date of this "Edición española" as 1856. Since the Spanish edition has not been quoted by de Selys himself, as far as I am aware, nor by Hagen, Kirby, Muttkowsky, Ris, nor by any other author except Gundlach, I have retained Gundlach's citations of it wherever they occur. All other writers, including de Selys, quote from the French edition.

⁸ Anales Soc. Españ. Hist. Nat., (2), ii, p. 261.

FAMILIA ODONATA. Page 212

TRIBU AGRIONINA.

SUBFAMILIA CALOPTERYGINA.

Género **HETAERINA** Hagen

Hetaerina cruentata, (...) P. 212. Aug. 15, 1888. **Hetaerina cruentata** (Ramb.).

Calopteryx cruentata; Selys Cub. p. 196.

Esta especie que no hemos observado, fué indicada como de Cuba por Selys.

Gundlach's description is a translation of Hagen (1861), p. 59; "antecubitales" is erroneously rendered "denticubitales."

SUBFAMILIA AGRIONINA.

Género **LESTES** Leach

Lestes forficula. (34.) P. 213. Aug. 15, 1888. **Lestes forficula** Ramb.

Cogí esta especie en los alrededores de Cárdenas.

Está la descripción del ♂ en la Synopsis [Hagen 1861], y yo tengo la de la ♀ en mis apuntes. Donde difieren ambas, pondré la de la ♀ entre paréntesis. Gundlach then translates Hagen (1861), p. 68, and adds the following at appropriate places for the female: (boca y frente pardos, mejillas azul-celestes, vértice olivado; ojos azul-celestes;) (protórax ceniciento-verdoso con la línea media angosta y estrías morenas; mesotórax en su parte superior ceniciento-verdoso, con 4 líneas verde-metálicas y la intermedia blanca, orillada de moreno; metatórax ceniciento con 3 manchitas amarillentas, de las cuales está una entre las alas anteriores y un par entre las posteriores;) (abdomen por encima verde-metálico-intenso, en las articulaciones ceniciento; los 3 últimos segmentos son cenicientos;) (pies por encima verdoso-oscuros, por debajo blanquecinos).

I have compared one male and one female from Havana, Cuba, taken by Baker, and two females from Alta Mira, Mexico, taken by Hoag; the description is correct except that "antecubitales" should be "postcubitales."

Lestes tenuata. (103.) P. 214. Aug. 15, 1888. **Lestes tenuatus** (Ramb.).

Lestes tenuata Ramb.; Selys Cub. p. 196.

Existe en toda esta Isla . . .

I have compared one male and one female from Atoyac, Mexico, and one female from Cuba (ex coll. Needham) with Gundlach's description, which is of the male only and is apparently original; in it he speaks of the eleventh and twelfth segments of the abdomen; they apparently are the ninth and tenth respectively.

Lestes spumaria. (62.) P. 215. Aug. 15, 1888. **Lestes spumaria** Hagen.

He cogido esta especie en Cárdenas.

Gundlach describes first the colors of the female, then gives briefly the differences shown by those of the male, but gives no description of the appendages. I have no specimens for comparison at the present time, but have quoted and figured two Cuban males.⁹

Lestes scalaris. (104.) P. 216. Aug. 15, 1888. **Lestes scalaris** Calvert.

Lestes scalaris, Hagen especie nueva, pero que será pronto publicada.

Colectada en la Ciénaga de Zapata.

♂. Toda la cabeza es parda menos una faja transversa por los estemata, que se extiende luego sobre la orilla de los ojos, los que son por encima pardos, por debajo cenicientos; el protórax es pardo, apenas con dibujos oscuros; el mesotórax es por encima pardo-claro, en cada lado del medio hay una faja verde-olivada-metálica, que hacia atrás se dilata en forma de diente. Mas al lado hay otra que empieza con una mancha, se adelgaza luego y forma después el diente. Los lados del meso- y metatórax son amarillo-pálidos; éste tiene en su parte inferior dos puntos negros en fondo blanquecino y es por encima pardo. El abdomen es por encima pardo con viso olivado-metálico principalmente las divisiones; el segmento undécimo tiene una mancha gemela pardo-claro en su base; los piés son por encima verdoso-blancos, por debajo negros; las alas son cristalinas.

I have compared one male from Mayaguez, Porto Rico, with this description which, it will be noticed, omits the appendages. My description¹⁰ of this as a new species,—not knowing at that time of Gundlach's work—was based on a male by Gundlach and one probably by Poey, both from Cuba, and the male from Mayaguez just quoted. Gundlach's description refers probably to the "older stage" of my description.

Dr. Ramsden's note on the type of this species in the Instituto at Havana is:

"In collection N. $\frac{1}{2}$ $\frac{4}{5}$ *Lestes scalaris* ♂ (there is but one example in very good condition). In Gundlach's MS. catalogue: $\frac{1}{2}$ $\frac{4}{5}$ *Lestes scalaris* Hagen n. sp. Localidad: Zarabanda."

Lestes (Hypolestes) Trinitatis. (118.) P. 216. Aug. 15, 1888. **Ortholestes abbotti** Calvert.

Lestes Trinitatis Hagen, especie nueva que no está todavía publicada, pero lo estará pronto.

He cogido esta especie en el Valle de Trinidad, y en Yateras. Ambos sexos difieren entre sí.

⁹ Ann. Carn. Mus., vi, p. 97, pl. i, figs. 7, 19, 29, 1909.

¹⁰ Ann. Carn. Mus., vi, p. 93, pl. i, figs. 6, 17, 18, 1909.

♂. Muy adulto. Labio superior y frente muy lustrosos negros con un viso azul. Mejillas y una línea en el borde del ojo pajizas; vértice y cogote negro-mates con una mancha y detrás de ésta una faja en el medio interrumpida transversal azul-aplomada, mate; ojos en su mitad superior morenos, en la inferior olivado-cenicientos; todo el cuerpo es negro-mate, pero con un sobre-color azul-aplomado en los bordes anterior y posterior del protórax y en el centro de cada lado del mismo, en la parte superior del mesotórax y en sus lados, con unas manchitas entre las cuatro alas y en la parte lateral é inferior del metatórax, en la base lateral é inferior del abdomen y encima de los segmentos abdominales; los apéndices caudales y los pies son negros; las alas cristalinas.

♂. Más jóven. En el mesotórax se ve una faja amarilla en un lado, que desaparece poco á poco hacia atrás, y otra inferior y dos fajas desde los dos últimos pares de pies hacia la base de las alas; el metatórax tiene por encima manchitas amarillas; el abdomen es negro, con una manchita larga lateral amarilla en el primer segmento; en el segundo hay en la base dos manchitas, y en el lado otra mancha larga como línea; en los cuatro siguientes la base solamente es amarilla.

♀. El protórax es negro, con una mancha anterior transversal amarilla y otras parduscas reunidas; el mesotórax es negro, con una línea pardo-cenicienta cerca de la línea intermedia, otra línea lateral entera y otra inferior por delante abreviada y pasando al color pardo-ceniciento, otra tercera por el estigma, que desaparece hacia atrás, y en fin, una cuarta más abajo hacia las alas posteriores, la que tiene en su borde inferior una línea negra; el metatórax tiene en la base de cada ala una manchita aplomada. El abdomen es negro, con los segmentos en el lado de la base provistos de una manchita redonda, y en los lados de una línea longitudinal amarilla; el segmento antepenúltimo tiene una manchita larga lateral, el penúltimo una mancha transversal, y el último dos manchitas aproximadas amarillas. Pies negros, con los muslos posteriores por debajo pálido-pajizo-verdosos.

It will be noticed that the appendages and dimensions are omitted from the description. I have compared the male type of *Ortholestes abbotti* Calvert,¹¹ a male from Hayti, taken by W. L. Abbott, with the above-described "♂ muy adulto," a young male of *O. clara* Calvert from Kingston, Jamaica, taken by W. J. Fox, 1891, with that of the "♂ más jóven" and a female of *O. clara* from Kingston, taken by E. M. Aaron, May, 1890, with that of the female. The female described by Gundlach was older than this Kingston female.

Although Gundlach has given no venational or generic characters, in view of the data which I have given,¹² the name *Ortholestes* becomes a synonym of *Hypolestes* Gundlach, *O. abbotti* a

¹¹ Proc. Acad. Nat. Sci. Phila. 1893, p. 382.

¹² Ann. Carn. Mus., vi, p. 91.

synonym of *H. trinitatis* Gundlach, the type of the genus, and *O. clara* becomes *H. clara* (Calvert).

Dr. Ramsden's note on the types of this species in the Instituto at Havana is:

"In collection: N. $\frac{118}{132}$ Hypolestes Trinitatis ♂ adulto (1 complete example). Id. id. id. ♀ juv. (1 example with abdomen broken off but in the box). In MS. catalogue: 118-132 Lestes (S. gen. Hypolestes) Trinitatis Hagen; under the above numbers are these 119-133, in red ink. (Probably these numbers correspond to the ♀ juv. when sent to Hagen, as Gundlach thought [it] to be a different species and probably also this second example is from Buenavista near Bayamo, and not from Trinidad.) The catalogue says: Localidad-Trinidad. Bv."

Género **PROTONEURA** Selys

Protoneura (Protoneura) capillaris. (95.) P. 218. Sept. 15, 1888.

Protoneura capillaris (Ramb.).

Protoneura capillaris Ramb.; Selys Cub. p. 200.

Se encuentra en toda la Isla.

I have compared one male from Cuba, taken by Ch. Wright, with Gundlach's description which is of both sexes and correct, except that the "Longitud 20 mil." is too little; it should be 35 mm.

A wing of this species and its base (on a larger scale) are figured in the Atlas to Sagra.¹³ Gundlach does not quote these figures, nor does any other author, as far as I know.

This species, recognized by Kirby, Muttikowsky and Williamson¹⁴ as the type of its genus, has been redescribed briefly and figured¹⁵ by the last-named author.

Protoneura (Microneura) caligata. (83.) P. 219. Sept. 15, 1888.

Microneura caligata Selys.

La cogí en el Valle de Trinidad en la orilla de un arroyo.

In the absence of specimens, I have compared Gundlach's description with that of de Selys¹⁶ and it seems to be correct.

¹³ Articulata, tab. 18, figs. 2, 2a.

¹⁴ Proc. U. S. Nat. Mus., xlviii, p. 625, 1915.

¹⁵ T. c. pl. 42, fig. 6, venation.

¹⁶ Rev. Syn. Agrion., p. 206, in Mem. Couron. Acad. Roy. Belg., tome xxxviii.

Protoneura (Neoneura) carnatica. (29.) P. 220. Sept. 15, 1888.

Neoneura carnatica Selys.

La he cogido en la sabana de Guamacaro (al Sudoeste de Cárdenas) en la orilla del río.

I have compared one male from Cuba, taken by Poey, 1866 III, with Gundlach's description and find it to agree therewith and also with the *carnatica* of Mr. Williamson's key.¹⁷

Protoneura (Neoneura) María. (144.) P. 221. Sept. 15, 1888. **Neoneura maria** (Scud.).

De Güines y la Isla de Pinos. Doy la descripción hecha por Scudder en extracto, á falta de una hecha por mí.

I have compared one male from Cuba, taken by Poey, 1866, with Gundlach's description and it agrees therewith and with the *maria* of Mr. Williamson's key.¹⁸ In Gundlach's description, however, the sign ♀ is an error for ♂.

Género **AGRIÓN** Fab.

Conservo los nombres de los subgéneros como están en la Synopsis de Hagen, aunque Selys ha establecido más tarde otros.

Agrión (Nehalennia) macrogaster. (...) P. 222. Sept. 15, 1888.

Telebasis macrogastra (Selys).

Agrión macrogaster Selys Cub. p. 197.

No he observado esta especie mencionada por Selys en la Sagra.

Gundlach's description is a translation of Hagen (1861).

Agrión (Ischnura) Ramburii. (33.) P. 223. Sept. 15, 1888. **Ischnura ramburii** (Selys).

Agrión Ramburii Selys Cub. p. 199.

var. *tuberculatum* Selys Cub. p. 198.

Es una especie, que varía en el colorido, y que habita sobre toda la Isla, . . .

The description is a translation of Hagen (1861).

Agrión (Enallagma) coecum. (31.) P. 224. Sept. 15, 1888. **Enallagma coecum** (Hagen).

Esta especie vive sobre toda la Isla y también en San Thomas.

Hagen había nombrado al principio los ejemplares cubanos *A. cardenium* Hagen, pero luego reconoció la igualdad con los *A. coecum* de San Thomas y suprimió el nombre *cardenium*.

I have compared a number of Cuban specimens of both sexes with Gundlach's description and find it correct, although in the female the labrum is chiefly pale, with only a small median basal, black elongated spot or line, whereas Gundlach says: "Labio

¹⁷ Trans. Amer. Ent. Soc., xliii, pp. 213-214, 1917.

¹⁸ *L. c.*, 1917.

superior por delante azul, en el resto negro;" however, his description of *A. truncatum* seems to indicate that he considered the nasus (post-clypeus) to be a part of the labrum.

I have also studied the question of the distinctness of *coecum* Hagen and *cardenium* Hagen with these results:

Twenty-one males from Cuba show a variation in the abdominal appendages ranging from that seen in plate XXXV, figure 38 through 41 and 42 to 39. Five males from Jamaica have the appendages as, or very nearly as, in figures 44 and 45. One male from Hayti has the appendages as shown in figure 40. The Jamaican specimens appear to correspond to the typical *coecum*, which was from the Island of St. Thomas. Mr. Nathan Banks, on comparing the drawings from which these figures were made with Hagen's types in the Museum of Comparative Zoology, at Cambridge, writes me that "*coecum* is your figure 40, the upper interior view is very like your figure 40a with apical barely longer; from the side the lower part is not hooked so much at tip; the lower appendages are more slender than your figure. *Cardenium* is close to your no. 42p or no. 38; seen from side the apical part is convex above and concave below and almost pointed as in your no. 38p, but this apical part is rather longer than your no. 38 and below is scarcely swollen in middle, so if turned only a bit one sees the tooth, and the lower basal part is shaped more like your no. 42p, the outer edge almost at right angles with the upper apical part, not grading into it as your no. 38p; seen from above within it is very close to your 38a, with apical part, as I said, a trifle longer; the intermediate basal pieces scarcely show from above."

The only constant differences which I have found between seventeen females from Cuba and three females from Jamaica are in the color pattern of the prothorax and of the mesostigmal lamina.

Summing up for both sexes, the case stands as follows:

Coecum (three males, three females from Jamaica only): ♂. A small single tooth on the inner (mesal) surface of the superior appendages at about two-thirds their length; the inferior branch of the same appendages, seen in profile view, as long as wide and forming between itself and the superior branch a sinus which extends distinctly cephalad.

Stigma of the front wings tending to be broader and with a more obtuse antero-external angle.

Pale postocular spots wider, *i. e.*, .45-.49 mm., measured from cephalic to caudal edge.

Color pattern on sides of prothorax, on mesostigmal lamina and on mesinfraepisternum as in the female.

♀. Stigma and pale postocular spots as in the male.

Black on each side of middle prothoracic lobe sinuately, and less deeply, emarginated by the pale color inferiorly (fig. 48t).

Mesostigmal lamina with its external half pale, internal (mesal) end black (fig. 48t).

Mesinfraepisternum predominantly black, only its lowest fourth to third pale (fig. 48t).

Abdomen, ♂ 26–27.5, ♀ 24–27; hind wing, ♂ 17–18.5, ♀ 17–20; costal edge of stigma, front wing (including the widths of both bounding cross-veins), ♂ .52–.56, ♀ .52–.63 mm.

Cardenium (twenty-one males, eighteen females from Cuba only): ♂. Tooth on the inner surface of the superior appendages at six-tenths to seven-tenths their length, developed as a carina slanting caudad and mesad, the two ends of which are more elevated so as to form two pointed tubercles; inferior branch of the same appendages, seen in profile view, distinctly wider than long (even to twice as wide as long) and forming between itself and the superior branch only a very shallow sinus which extends much less cephalad (if at all) as compared with *coecum*.

Stigma of the front wings tending to be narrower and with a more acute antero-external angle (cf. pl. xxxv, figs. 38s, 39s with 45s).

Pale postocular spots narrower, *i. e.*, .28–.38 mm.

Color pattern on sides of prothorax like that of the female (in seventeen males, like *coecum* (two males), or obscured by pruinose (two males); of mesostigmal lamina resembling that of *coecum*; of mesinfraepisternum like that of the female, *i. e.*, with the inferior half or more pale (eleven males), or with only the lowest third pale (eight males).

♀. Stigma of the front wings (cf. pl. xxxv, figs. 43s, 46s, 47s with 48s) and postocular spots as in the male.

Black on each side of middle prothoracic lobe angularly, and more deeply, emarginated by the pale color inferiorly (cf. figs. 43t and 48t).

Mesostigmal lamina black with an oblique pale streak running from near the antero-lateral to the postero-mesal angle (fig. 43t); in some the anterior margin of the lamina is also narrowly pale so that the two pale streaks, uniting laterad, form a V.

Mesinfraepisternum black with the inferior half (or more than half) pale (fig. 43t) or, less frequently (three females), with only the lowest third pale.

Abdomen, ♂ 21–24.5, ♀ 22–26; hind wing, ♂ 15–16.5, ♀ 16–17.5; costal edge of stigma (measured as for *coecum*), ♂ .56–.65, ♀ .52–.63 mm.

Although the difference between the pterostigmata of *coecum* and of *cardenium* is a relative, not an absolute, one, it will be seen, on comparing the measurements of hind wings and of stigmata of the two forms, that *cardenium*, with absolutely shorter wings, has the stigma equal to or longer than the stigma of *coecum*.

The preceding comparisons are between Jamaican and Cuban specimens only. A single male from Hayti, received from the late Prof. P. R. Uhler (Acad. Nat. Sci. Phila.), furnishes some connecting features. Thus, the tooth on

the inner surface of the superior appendages, the pale postocular spots (.35 mm.), and the color pattern on the sides of the middle prothoracic lobe resemble those of the Cuban form, while the inferior branch of the superior appendages, the stigma of the front wings and the coloring of the mesostigmal lamina are like those of the Jamaican examples. (Cf. figs. 40a-s). The mesinfraepisternum has more than the lowest third pale; the dimensions, corresponding to those given above, are: 26, 16.5 and .56 mm.

A male and a female from Biscayne Bay, Florida, taken by Mrs. A. T. Slosson (Acad. Nat. Sci. Phila.), agree essentially with the Cuban examples, except in their larger size: abdomen, ♂ 27, ♀ 28; hind wings ♂ 19, ♀ 19.5; costal edge of stigma, front wing, ♂ .7, ♀ .84 mm.

This study of the present material, therefore, seems to justify the conclusion of Dr. Hagen¹⁹ that the Cuban, and we may add Floridan, examples represent a geographical race which may be designated as *Enallagma coecum cardenium* (Hagen).

Agrión (*Enallagma*) cultellatum. (101.) P. 225. Oct. 15, 1888. **Enallagma cultellatum** Hagen.

Lo cogí en la ciénaga de Zapata. El ejemplar era un ♂.

I have compared a male from Amatitlan, Guatemala, with Gundlach's description, and find the latter correct except that "los segmentos 7o. y 8o." should read "8o. y 9o."

Agrión (*Enallagma*) truncatum. (109.) P. 226. Oct. 15, 1888. *Agrión truncatum* Hagen nov. sp.

He cogido esta especie en la ciénaga de Zapata.

♂. Labio superior y frente bermejizo-anaranjados, el labio con tres puntos negruzcos en cada una de las dos piezas de que se compone; mejillas y la parte inferior de los ojos amarillas, la superior es castaño-anaranjada; el vértice es negro-bronceado con una línea transversal de los estemas virua. Tórax negro-cobrizo-metálico; protórax con los bordes marcados con dos puntos; el mesotórax tiene en sus lados dos fajas pardusco-anaranjados; de este color es también el lado del tórax, y el metatórax tiene además muchas manchitas en su parte superior. El abdomen es negro-olivado-metálico con los bordes laterales del 1o. y 2o. segmentos pardusco-anaranjados; los bordes anteriores de los segmentos siguientes y su parte inferior son pajizos. El 10o. en sus lados, el 11o. por encima y el 12o., tienen una mancha lateral posterior pardusco-anaranjada; los apéndices son en la punta negros. Piés pardusco-anaranjados con los muslos apenas teñidos de negro en su parte superior.

♀. El color de la cabeza es ceniciento-verdoso-claro en todas las partes que en el ♂ son amarillas ó anaranjadas. Los ojos son por encima olivados.

I have compared one male belonging to the Museum of Comparative Zoology, labeled "34" (a Poey label), "Cuba Poey 1864"

¹⁹ Bull. Acad. Roy. Belg., (2) xli, p. 530, 1876; on the same page is a French version of a description of the colors of the Cuban *cardenium* by Gundlach.

(in Hagen's hand) and "truncatum" (in a third hand), with this description with which it agrees in most respects. By "las dos piezas" of the labrum are apparently meant the labrum proper and the supra-clypeus (nasus). The tenth, eleventh and twelfth abdominal segments seem to correspond to the eighth, ninth and tenth respectively; how Gundlach counted twelve abdominal segments, I do not see. This species is treated at greater length later in this paper.

Dr. Ramsden's note on the types of this species in the Instituto at Havana is:

"In collection: N $1\frac{3}{4}$ Agrion truncatum ♂ (1 example, one wing broken). Id. id. id. ♀ (1 example without head or abdomen). In MS. catalogue: 109-134 Agrion truncatum Hagen, localidad: Zarabanda (no mention is made of *Enallagma*)."

Agrión (Enallagma) civile. (149.) P. 226. Oct. 15, 1888. **Enallagma civile** (Hagen).

Esta especie fué cogida en Güines.

Gundlach's description is a translation of Hagen (1861).

Agrión (Enallagma) aduncum. (105.) P. 227. Oct. 15, 1888. **Argialagma minutum** (Selys).

Lo cogí en varias localidades de la parte occidental de la Isla.

Gundlach's description is a translation of Hagen (1861).

Agrión (Pyrrhosoma) vulneratum. (63.) P. 228. Oct. 15, 1888. **Telebasis vulnerata** (Hagen).

Vive sobre toda la isla de Cuba y también en la isla de Puerto-Rico,

Gundlach's description is a translation of Hagen (1861).

Agrión (Erythagrión) dominicanum. (...) P. 229. Oct. 15, 1888. **Telebasis dominicana** (Selys).

Agrion dominicanum Selys Cub. p. 198.

No he observado esta especie, que Selys menciona en la obra de la Sagra.

Copio la descripción dada en la Synopsis por Hagen, quien la transcribe de Selys.

Agrión (Erythagrión?) discolor. (...) P. 229. Oct. 15, 1888. **Amphigrion saucium** (Burm.).

Agrion discolor Burm.; Selys Cub. p. 198.

No he observado esta especie, mencionada también por Selys en la obra de la Sagra . . . La descripción dada por Burmeister es: (a translation into Spanish follows).

En esta especie dice Hagen Syn. p. 80, que el *Agrión dorsale* de Selys será acaso diferente. No encuentro su descripción.

Selys menciona aún otra especie que el Sr. Poey y yo no hemos observado, á lo menos no las tenemos en la colección. Ella es:

Agrión (?) Doubledayi. (...) P. 230. Oct. 15, 1888. **Enallagma doubledayi** (Selys).

Agrión Doubledayi Selys Cub. p. 199.

Copio la descripción de la Synopsis [Hagen 1861].

Agrión (Leptobasis) vacillans. (43.) P. 231. Oct. 15, 1888. **Leptobasis vacillans** Hagen.

He cogido esta especie en localidades de toda la Isla.

I think it desirable to reproduce Gundlach's description in full.

Ambos sexos no difieren en su colorido. Labio superior anaranjado, mejillas verdoso-amarillas, frente y vértice negros, occipucio verdemar. Los ojos son por encima negros, por debajo amarilloso-verdes; protórax negro, con una mancha verdoso-amarilla en la parte delantera; mesotórax por encima negro, con una faja lateral verdoso-amarilla; del mismo color es también la parte inferior lateral; metatórax negro, con manchitas verdoso-amarillas. Abdomen en sus dos divisiones del primer segmento verde-anaranjado, por encima con una mancha larga negra; los segmentos 2o. y 3o. rojos de coral, el 4o. idem, pero hacia el fin negro con viso olivado metálico, los 5o. y 6o. de este color, pero con una manchita en cada lado de la base ó sea en la unión de los dos segmentos. El 6o. tiene ya el fin anaranjado-rojo, y este color tiene también el resto del abdomen. Por debajo son la cabeza y el tórax blanquecinos, el abdomen en su base y su fin es pálido-rojo de coral, y en la mitad amarillo-pálido ó pajizo; los piés son pálido-amarillento-pardos; las alas son cristalinas.

On comparing one male of *L. vacillans* var. *atrodorsum* Calvert, from Tlacotalpam, Mexico, and one male and one female from Teapa, Mexico, with the above, I find that the first male agrees better with Gundlach's description of the thorax, while de Selys' (original) description of *vacillans*,²⁰ based on Cuban material from Gundlach, in the Paris Museum, reads: "Thorax étroit, roux jaunâtre jusqu' à la suture humérale avec une bande anté-humérale brune de chaque côté de l'arête dorsale." Gundlach's description of the "dos divisiones del primer segmento" [= seg. 1 and 2?] should be contrasted with de Selys' "Abdomen filiforme, brun jaunâtre orangé en dessus, jaune pâle en dessous" with no mention of dark color on the anterior segments, and Gundlach's account of the "4th, 5th and 6th" segments with de Selys' "articulations terminales des 3-7e segments cerclées de noir, la base des mêmes segments jaune pâle." After all, as I have already stated,²¹ one is still tempted to regard *atrodorsum* as aged *vacillans*.

²⁰ Bull. Acad. roy. Belg., xliii, p. 101, 1877.

²¹ Biol. Centr.-Amer., Neur., p. 121.

Agrión (*Anomalagrión*) *hastatum*. (108.) P. 232. Oct. 15, 1888.

***Anomalagrión hastatum* (Say).**

♂. *Anomalagrión hastata* Say; Selys Cub. p. 200.

♀. *Trichocnemis minuta* Selys Cub. p. 197.

Esta especie vive sobre toda la isla de Cuba, . . .

I have compared one male from Havana, taken by Baker, with Gundlach's description of the male, with which it agrees. His description of the female, however, is different from any female that I know, so that it seems advisable to reproduce it here.

♀. Boca, labio superior y frente anaranjados; en la parte posterior del labio se ve una línea transversal negra; vértice negro-olivado-metálico; este color pasa angostamente detrás de los ojos; el cogote tiene un color anaranjado vivo, el cuello es negro-olivado lustroso, con el borde posterior anaranjado. Protórax negro-olivado-metálico, con los bordes laterales anaranjados; mesotórax anaranjado con una faja ancha negro-olivado-metálica encima, y una línea muy fina en los lados. Metatórax amarillo claro con las suturas negras. Abdomen anaranjado con los bordes de los segmentos en su unión negros; el primer segmento tiene por encima un color negro-olivado-metálico que ocupa las tres cuartas partes posteriores, y en los tres siguientes ocupa toda, pero dejando en el segundo segmento el borde lateral anaranjado. El último segmento tiene en su primera parte dos manchitas negro-olivadas y en los demás es barbejo. Píes amarillo pálidos con espinas negras. La espina del segmento octavo falta. Alas cristalinas con el pterostigma amarillento y regular.

It will be noticed that Gundlach considers *Trichocnemis minuta* Selys to be the female of this species, although de Selys himself, in his Synopsis of the legion Agrion,²² referred *T. minuta* to *Enallagma? aduncum* Hagen. Gundlach knew this work of de Selys, at least he quotes it frequently. Gundlach's description of the female, here reproduced, is not that of the true female of *Argialagma minutum*, as the species is now known.

The male and female of *Agrion hastatum*, entire, the wings of both sexes on a larger scale, and the base of a wing are shown in the Atlas of Ramon de la Sagra's Cuba.²³ These figures are not quoted by Gundlach or by any other author, as far as I know

Agrión (*Ceratura*) *capreolus*. (106.) P. 233. Nov. 15, 1888. ***Ceratura capreola* (Hagen).**

Lo he colectado en toda la Isla y además vive en Puerto-Rico. . . .

Gundlach describes the male and the black female only. I have compared one male from Havana, taken by Baker, one male from Vera Cruz, Mexico, one black female from Los

²² Bull. Acad. roy. Belg. (2), xli, p. 499, no. 94, 1876.

²³ Articulata, tab. 18, figs. 1-1f.

Amates, Guatemala and one black female from São Paulo, Brazil, with Gundlach's descriptions, and they agree.

TRIBU AESCHNINA.

SUBFAMILIA GOMPHINA.

Género **GOMPHOIDES** Selys

Gomphoides producta. (40.) P. 234. Nov. 15, 1888. **Gomphoides (Aphylla) producta** (Selys).

Aphylla caraiba Selys Cub. p. 193.

La cogí en la vecindad de Cárdenas.

I have compared one male from Havana, taken by Baker, and one female labelled "Cuba," taken by Poey, 1864, and find Gundlach's description correct.

It seems not impossible that the *Cyclophylla cubana* of P. Navas²⁴ may be this species.

SUBFAMILIA AESCHNINA.

Género **ANAX** Leach

Anax Junius. (121.) P. 235. Nov. 15, 1888. **Anax junius** (Drury).

Anax Junius Selys Cub. p. 194.

Lo he colectado en la parte occidental de la Isla.

I have compared one male from Guantanamo, Cuba, Feb. 13, 1914, taken by Dr. Henry Skinner, and one male from Montego Bay, Jamaica, with Gundlach's description, which is of this sex only.

Anax amazili. (23.) P. 236. Nov. 15, 1888. **Anax amazili** (Burm.).

Un ejemplar fué cogido en Octubre 1871 en la Habana.

Copio la descripción dada por Hagen en su Synopsis p. 119.

Género **AESCHNA** Fab.

Aeschna adnexa. (45.) P. 237. Nov. 15, 1888. **Aeshna (Coryphaeschna) adnexa** (Hagen).

Vive en la parte occidental de la Isla, y no es conocida en otros países.

I have compared males from Guantanamo, Cuba, Feb. 13, 1914, taken by Dr. Henry Skinner; San Domingo; Casiguana, Ecuador, taken by Prof. F. Campos R.; and Alta Mira, Mexico, taken by Dr. Hoag, with Gundlach's description, which is of the male only, and find it correct; here his "penúltimo" and "último" segments of the abdomen are the ninth and tenth respectively.

²⁴ Mem. Pontif. Accad. Rom. Nuovi Lincei, (2), iii, p. 2, fig. 1 (details), 1917.

Aeschna virens. (51.) P. 238. Nov. 15, 1888. **Aeshna (Coryphaeschna) virens** (Ramb.).

Cogí esta especie en la proximidad de Cárdenas y Mr. Scudder en la Isla de Pinos.

I have compared one male from Trinidad [sic] (ex coll. Selys), one male and one female from Alta Mira, Mexico, and one female from the Amazon (Bates, ex coll. Selys) with Gundlach's description, with which they agree, except that Gundlach says: "Labio negro," while in our specimens the labrum is pale green with its distal third to half black or red. In Bates' female the labium is yellowish or yellowish brown with the apex of the median lobe reddish or brownish.

Aeschna ingens. (46.) P. 239. Nov. 15, 1888. **Aeshna (Coryphaeschna) ingens** (Ramb.).

Colectado en la vecindad de Cárdenas; el tipo era de la Florida.

I have compared both sexes from Florida with Gundlach's description. He says "el triángulo detrás de los ojos [= occiput] y el cogote [= rear of the head] son negros," but in all the specimens examined (three males, three females) the occiput is yellow narrowly margined with blackish, and there is a large crescentic pale greenish spot behind each eye. Otherwise the description agrees. As to the remark on the type's being from Florida, Rambur expressly says of his original specimen: "sans indication de patrie."

Género **GYNACANTHA** Ramb.

Gynacantha trifida. (67.) P. 240. Nov. 15, 1888. **Gynacantha trifida** Ramb.

Gynacantha trifida Ramb.; Selys Cub. p. 194.

La he cogido en la vecindad de Cárdenas. Suele volar al anochecer. Una vez la he visto en la Habana en innumerable cantidad y por largo tiempo, volando hacia el Sud en inmigración. No comprendo de donde pudieron venir.

I have compared one male from Cuba, taken by Poey, one male from Habana, Cuba, taken by Baker, and one female from Bath, Jamaica, with Gundlach's description and find it correct.

Gynacantha septima. (...) P. 241. Dec. 15, 1888. **Gynacantha septima** Selys.

Gynacantha septima Selys Cub. p. 195.

No poseo esta especie, la cual indica Selys como recibida por Poey. . . . Hagen da la siguiente descripción sacada de Selys Cub.

I have compared one male and one female from Cuba, from Poey, 1864, in the collection of the Museum of Comparative Zoology, with the description.

Gynacantha gracilis. (24.) P. 242. Dec. 15, 1888. **Gynacantha nervosa** Ramb.

He cogido esta especie en la vecindad de Cárdenas y en la ciénaga de Zapata.

I have compared one female from Cuba, taken by Poey, 1864, in the Museum of Comparative Zoology, with Gundlach's description, which is of the female only; they agree. This specimen is one of those cited in the *Biologia Centrali-Americana*²⁵ as *G. nervosa* Rambur.

Gynacantha ereagris. (74.) P. 243. Dec. 15, 1888.

Gynacantha ereagris Hagen mss. nueva especie.

Gynacantha ereagris Hagen, *Proceedings Bost. Soc. Nat. Hist.*, XI,] p. 291.

Parece que en esta página está por errata *oreagris*.

La cogí en Agosto en la vecindad de Cárdenas.

Labio superior, frente y bultos frontales pálido-olivado pajizos, estos en la punta, la línea intermedia é hinchazón entre los estemas negros; ojos por encima azules-oscuros, por debajo pardo-claros con un viso á olivado. Triángulo detrás de los ojos amarillos, la parte detrás de los ojos por encima negra, por abajo pajiza. Protórax pardo con su borde posterior olivado; mesotórax en su borde delantero amarilloso verde, seguido por una faja transversal negrusca, los demás verdes; sulco intermedio y una mancha transversal morenos, metatórax negro con varias manchitas verdes dispuestas así: 1, 3, 2, 3, 1 y otras dos en la raíz de las alas. Abdomen en el primer segmento pardo con una faja transversal posterior verde, el segundo también pardo con la línea intermedia y delante el borde posterior de cada pieza verde; el tercero también pardo, en la base del segmento y en los bordes anterior y posterior de la segunda pieza del segmento en cada lado verde, los siguientes negros con el color verde menos fuerte y menos ancho, el último segmento es negro, solamente en el borde posterior de la primera pieza algo olivado-verde, la segunda pieza con los apéndices superiores morenos, los apéndices inferiores y una manchita sobre la base de cada apéndice lateral ferruginosos. Piés bermejizos.

No he apuntado las medidas y el número de células.

I have compared Gundlach's description with three specimens in the M. C. Z., labeled "criagris" (I know not by whom): one male "70" (probably Cuba by Poey as the handwriting of this label is the same as in Poey numbers); one female, Cuba, Gundlach 1864 "74" (the number Gundlach gives to this species); and one female, Cuba, Poey 1866; also with three specimens in the Acad. Nat. Sci. Phila.: one male, Havana, Cuba, taken by Baker, no. 3517; one female, Santiago, Cuba, September 24, 1903, taken by Capt. W. Robinson; one male, Crooked Island, Bahamas, November 24, 1890, taken by J. P. Moore and D. J. Bullock, University of Pennsylvania Expedition. They all agree.

²⁵ Neur., p. 193.

This species is discussed in detail later in this paper (*postea*, page 386).

Dr. Ramsden's note on the types of this species in the Instituto at Havana is:

"In collection N $\frac{74}{80}$ *Gynacantha creagris* (1 example in good condition). Id. id. id. ♀ (1 example in good condition). In MS. catalogue: *Gynacantha creagris* Hagen, Localidad: Cárdenas. (Catalogue nor label say *ereagris* as in your letter.)"

Dr. Ramsden's last remark calls attention to a question of the spelling of the specific name which may require a decision by the International Commission on Zoological Nomenclature. As indicated by the verbatim reprint given above from Gundlach's text, Gundlach twice spells the name *ereagris*. In the "Indice de los nombres científicos," p. ii, he spells it *creagris*, as he does in his own label quoted by Dr. Ramsden. Gundlach's "Fe de erratas," pp. iv-v, although correcting a number of errors in the text relating to the Odonata, makes no mention of *ereagris*. A Greek word "creagris," a small flesh hook, exists, but I have found no "erea-gris." The question, of course, is a technical one of interpretation of the code of nomenclature.

TRIBU LIBELLULINA.

SUBFAMILIA CORDULINA.

Género **TETRAGONEURIA** Selys

Tetragoneuria balteata. (...) P. 244. Dec. 15, 1888. **Macrodiplax balteata** (Hagen).

No he observado esta especie. Hagen dice en los Proceedings [Bost. Soc. Nat. Hist., XI, p. 291, 1867] que ha visto solamente un macho (cubano.) Es, pues, una especie dudosa como habitante de Cuba.

Hagen en su Synopsis [1861] da la descripción. [A translation into Spanish then follows.]

Dr. F. Ris, the latest writer on this species, refers it to the genus *Macrodiplax*, subfamily Libellulinae.²⁶

SUBFAMILIA LIBELLULINA.

Género **PANTALA** Hagen

Pantala flavescens. (79.) P. 245. Dec. 15, 1888. **Pantala flavescens** (Fab.).

Libellula flavescens Fab.; Selys Cub. p. 186.

Encontré esta especie en los contornos de Cárdenas durante la época de Agosto á Octubre.

I have compared one male from Santa Ana, III, 4, taken by

²⁶ Cat. Coll. Zool. Selys, fasc. xvi, Ire partie, p. 1038, 1913.

S. H. Hamilton, and one female from Havana, taken by Baker, both from Cuba, with Gundlach's description, which agrees, except that the "mancha morena" of the first abdominal segment is hardly E-shaped.

A German version of Gundlach's description is given by Hagen.²⁷

Pantala hymenaea. (80.) P. 246. Dec. 15, 1888. **Pantala hymenaea** (Say).

Encontrada en la playa de Cárdenas; . . .

I have compared one female from Saltillo, Mexico, with Gundlach's description which is of that sex only and they agree. A German version of Gundlach's description is given by Hagen.²⁸

Género **THOLYMIS** Hagen

Tholymis citrina. (11.) P. 247. Dec. 15, 1888. **Tholymis citrina** Hagen.

Cogí esta especie cerca de Cárdenas.

I have compared one male from Georgetown, British Guiana, and two males and one female, Babahoyo, Ecuador, with Gundlach's description, which is of both sexes. His males seem to have had more yellow on the fore wings than the three which I compared possess; perhaps the word "dos" was omitted from between "los" and "últimos segmentos" in his description of the superior appendages. Of the female Gundlach says: "Las manchas amarillas de las alas son menores, y en las alas anteriores casi imperceptibles."

A German version of Gundlach's description is given by Hagen.²⁹

Género **TRAMEA** Hagen

Tramea carolina. (...) P. 249. Feb. 15, 1889. **Tramea carolina** (Linn.).

Libellula carolina Linn.; Selys Cub. p. 185.

Esta especie está designada en la obra de la Sagra como habitante de la Isla de Cuba, pero ni el Sr. Poey, ni yó, hemos observado esta especie, sino la muy parecida *Tramea onusta* Hagen y es de suponer, como cree el Dr. Hagen, que Selys tuvo á su vista la *onusta*, que en aquel tiempo aún no era nombrada.

Gundlach's description is a translation of Hagen (1861).

²⁷ Stett. Ent. Zeit., xxviii, p. 215, 1867.

²⁸ T. c., p. 217.

²⁹ Stett. Ent. Zeit. xxviii, p. 219, 1867.

Tramea onusta. (...) P. 250. Feb. 15, 1889. **Tramea onusta** Hagen.

No he observads [*sic*] aún esta especie, pero el Sr. Poey la tenía en su colección en un ejemplar masculino.

Gundlach's description is a translation of Hagen (1861).

Tramea abdominalis. (12.) P. 251. Feb. 15, 1889. **Tramea abdominalis** (Ramb.).

Libellula basalis Burm.; Selys Cub. p. 185.

La he cogido cerca de Cárdenas, y existe también en la Isla de Pinos, . . .

I have compared one male from Havana, taken by Baker, and one female from Hamilton Island, Bermudas, Oct., 1905, taken by H. A. Snyder, with Gundlach's description which agrees, except that the Havana male has the superior appendages reddish, not "negros"; the female from Hamilton Island, however, has them black and males from other localities have them blackish with reddish at bases.

The German version of Gundlach's description³⁰ differs in a number of respects from that given in the present work.

Tramea insularis. (128.) P. 251. Feb. 15, 1889. **Tramea insularis** Hagen.

De la vecindad de Cárdenas.

I have compared one male from Cuba, taken by Poey, no. 37, with Gundlach's description which latter shows the following differences: labrum "negro," instead of brownish at the base (as it is also in other males examined); the superior appendages "con ápice negro," instead of reddish throughout (a San Domingo female has them largely blackish); legs "negros con la base de los muslos rojiza" (as a San Domingo male has them) instead of largely reddish; veins of the wings in the apical half "negras," instead of reddish or pale brownish.

A German version of Gundlach's description is given by Hagen.³¹

Dr. Ris³² refers *insularis* Hagen to *binotata* Rambur, after examining Rambur's type. He also considers the "*binotata* Ramb." of Calvert,³³ to be true *binotata*. There is, however, a difference between the descriptions of the hamules given by Ris and Calvert respectively, as to their length relative to the genital

³⁰ Stett. Ent. Zeit., xxviii, p. 223.

³¹ Stett. Ent. Zeit., xxviii, p. 224, 1867.

³² Cat. Zool. Selys, fasc. xvi, p. 991, 993, 1913.

³³ Ann. Carn. Mus., vi, p. 259, 1909.

lobe, which may or may not have some significance. Lines 5 and 6 on page 259 of the latter author's description,³⁴ should be corrected to read "Frons of ♂ superiorly metallic violet, of ♀ yellow with superior metallic blue stripe .7 mm. wide."

Tramea marcella. (35.) P. 252. Feb. 15, 1889. **Miathyria marcella** (Selys).

La he cogido cerca de Cárdenas en Noviembre.

I have compared one male and one female from Teapa, Tabasco, Mexico, with Gundlach's description and they agree in all essentials. The female which Gundlach describes had the brown basal band on the hind wings, as compared with the male, "más ancha, llega al triángulo, pero finaliza más lejos del borde posterior."

The German version of Gundlach's description³⁵ differs in some details.

Tramea simplex. (146.) P. 253. Feb. 15, 1889. **Miathyria simplex** (Ramb.).

Libellula simplex Ramb.; Selys Cub. p. 191.

No recuerdo donde la he cogido, pero se que en la parte occidental de la isla de Cuba.

I have compared one male from Teapa, Tabasco, Mexico, and one female from Havana, taken by Baker, with Gundlach's description which agrees and which corresponds to the German version,³⁶ although Hagen there says, "Von Gundlach ist keine Beschreibung gegeben."

Tramea australis. (60.) P. 255. Feb. 15, 1889. **Tauriphila australis** (Hagen).

La he cogido en los bosques cercanos á Cárdenas en Julio.

I have compared one male and one female from Havana, taken by Baker, with Gundlach's description and they agree. A German version of Gundlach's description has been published by Hagen.³⁷

Género **CELITHEMIS** Hagen

Celithemis eponina. (37.) P. 256. Feb. 15, 1889. **Celithemis eponina** (Drury).

Libellula eponina Drury; Selys Cub. p. 186.

³⁴ Ann. Carn. Mus., vi.

³⁵ Stett. Ent. Zeit., xxviii, p. 227, 1867.

³⁶ Stett. Ent. Zeit., xxviii, p. 228, 1867.

³⁷ Stett. Ent. Zeit., xxviii, p. 229, 1867.

He cogido esta especie en la Habana (paradero del Tulipan), y en Cárdenas. Es especie rara.

No habiendo tomado descripción del insecto vivo, me veo precisado á copiar, traduciendo la descripción dada por Hagen.

Género **LIBELLULA** Linn.

Libellula umbrata. (18.) P. 257. Mar. 15, 1889. **Erythrodiplax umbrata** (Linn.).

Libellula umbrata Linn.; Selys Cub. p. 189. (de Cuba).

Es una especie sumamente común y según su edad y sexo muy variable.

I have compared two males and two heterochrome females from Havana, taken by Baker, with Gundlach's description. Although he describes what he calls "El ♂ adulto," the description is not of the *oldest* stage as the "bultos frontales y vértice [son] negro-ferruginosos," "Tórax pálido, olivado-pardo," etc. He is in error when he speaks of the wings of the male: "la base y el ápice no tienen color." However, the paragraph on page 259, beginning "A veces es el ápice de las alas anteriores algo parduzco," although following the description of the female, applies, as well as the paragraph immediately preceding and that immediately following, to the male, probably.

Gundlach's description of the female is that of the heterochrome form. He adds: "Poey y yo hemos cogido dos ó tres hembras muy adultas con una faja como la tiene el macho adulto."

German versions of these descriptions, as well as others of this species, of different ages, by Gundlach are given by Hagen.³⁸

Libellula angustipennis. (16.) P. 259. Mar. 15, 1889. **Cannaphila angustipennis** (Ramb.) = **C. insularis funerea** (Carp.).

Libellula angustipennis Ramb.; Selys Cub. p. 188.

Cogí esta especie en los contornos de Cárdenas y Scudder en la Isla de Pinos.

I have compared one male from Cuba (without other data) and one female from Frontera, Mexico, taken by O. S. Westcott, with Gundlach's description and they agree.

Dr. Ris,³⁹ has shown the prior use of *angustipennis* for another species, so that the Cuban form must be known as *Cannaphila insularis funerea* (Carp.).

Libellula auripennis. (54.) P. 260. Mar. 15, 1889. **Libellula auripennis** Burm.

³⁸ Stett. Ent. Zeit., xxix, pp. 278 et seq., 1868.

³⁹ Cat. Coll. Zool. Selys, fasc. xi, p. 295, 1910.

Se encontró en bastante número en los contornos de Cárdenas, y de Cienfuegos, en la Isla de Pinos y en los Estados Unidos.

I have compared one male and one female from Altamira, Tamaulipas, Mexico, taken by Hoag, with Gundlach's description. He does not mention the sex of his specimens, but they were evidently females or young males, as indicated by such expressions as "frente y bultos frontales olivado-pardos, claros"; "Tórax ferruginoso con una faja pajiza intermedia," "abdomen . . . anaranjado-pálido con un viso olivado, y con la línea intermedia negra," etc. The statement "los apéndices caudales son casi nulos, negros," is puzzling.

Gundlach gives the dimensions (taken from Hagen 1861) as: "Longitud 48-56, entre las alas 76-85, pterostigma 6 milímetros," which corresponds well to those given in the *Biologia Centrali-Americana*⁴⁰ for this species. Dr. Ris⁴¹ has commented on Cuban examples which are smaller: ♂ abd. 31, hind wing 34, pter. 5; ♀ 29, 33, 5 mm., respectively.

Libellula herbida. (27.) P. 261. Mar. 15, 1889. **Cannacria (=Brachymesia) batesii** (Kirby).

Libellula herbida Hagen in Proceed. [Bost. Soc. Nat. Hist., XI] p. 292. Aún no está publicada su descripción.

Encontré esta especie en Octubre y Noviembre por Cárdenas.

♀ El borde de los labios es pardo; la frente, boca y los bultos frontales son blanco-pajizos; el vértice y occipucio pardos; ojos pardo-morados en su parte superior y ceniciento-olivados en su inferior; detrás del ojo hay en la parte inferior una mancha pajiza en el fondo negro; torax pardo olivado. Abdomen en los cuatro primeros segmentos olivado-pardo, claro; los cinco siguientes son del mismo color, pero con una mancha triangular negra que con su base ocupa toda el borde apical de los segmentos, y con su punta llega á la base; el color negro se aumenta en los segmentos posteriores y ocupa así todo el segmento penúltimo; el último es negro con su borde apical bermejizo-blanco; los apéndices caudales son rojizo-pardos. La parte inferior del tórax y el vientre son de un color pardusco muy claro, pero enteramente cubierto de una especie de polvo blanco-ceniciento. Los piés son morenos.

It will be noticed that Gundlach's description omits the wings and the dimensions altogether; it appears to correspond to the species known as *Cannacria batesii* Kirby,⁴² and one male and one female from Cuba, taken by Poey, belonging to the Museum of

⁴⁰ Neur. p. 206.

⁴¹ Cat. Coll. Zool. Selys, Libel., fasc. xi, p. 274, 1910.

⁴² Trans. Zool. Soc. Lond., xii, p. 341, pls. liii, fig. 1, lvii, fig. 9.

Comparative Zoology, listed in the *Biologia Centrali-Americana*,⁴³ under *Cannacria batesii*, were labeled "*herbida*" when they were lent to me in 1899. Kirby's paper was published on Aug. 14th, 1889,⁴⁴ while the installment of Gundlach's work containing the present species was, according to Dr. Ramsden's data (*antea*, p. 338), issued in March, 1889. The name *herbida*, therefore, has priority over *batesii*. *Cannacria* Kirby, however, has been shown by Dr. Ris,⁴⁵ from an examination of the type of *Brachymesia australis* Kirby, to be generically the same as *Brachymesia* Kirby. The correct name of the present species is, therefore, *Brachymesia herbida* (Gundlach).

Dr. Ramsden's note on the types of this species in the Instituto at Havana is:

"In collection N $\frac{37}{47}$ *Libellula herbida* ♂ (1 complete example in good condition). Id. id. id. (1 example with head broken which is loose in the box). In MS. catalogue: *Libellula herbida* Hagen. Localidad Cárdenas."

Género **ORTHEMIS** Hagen

Orthemis discolor. (38.) P. 262. Mar. 15, 1889. **Orthemis ferruginea** (Fab.).

Libellula discolor Burm.; Selys Cub. p. 188.

He observado esta especie en toda la Isla y también en Puerto Rico.

I have compared one male from Cuba, taken by Poey, and one male and one female from Havana (C. F. Baker) with Gundlach's description which agrees. A German version of Gundlach's description is given by Hagen.⁴⁶

Género **LEPTHEMIS** Hagen

Lepthemis vesiculosa. (50.) P. 264. Mar. 15, 1889. **Lepthemis vesiculosa** (Fab.).

Libellula vesiculosa Fab.; Selys Cub. p. 187.

La cogí en la vecindad de Cárdenas, también en la isla de Puerto-Rico; . . .

I have compared one male from Havana, taken by Baker, and one female from Guantanamo, Cuba, Feb. 10, 1914, taken by Dr. Henry Skinner, with Gundlach's description, which is based on fully colored individuals, and they agree.

⁴³ Neur., p. 326.

⁴⁴ cf. Biol. Centr-Amer., Neur., p. 230, footnote.

⁴⁵ Cat. Coll. Zool. Selys, Libel., fasc. xiv, pp. 734, 737, 1912.

⁴⁶ Stett. Ent. Zeit., xxix, p. 279, 1868.

Lepthemis attala. (49.) P. 265. June 15, 1889. ***Erythemis verbenata*** (Hagen) = ***E. plebeja*** (Burm.).

Libellula attala Selys Cub. p. 187.

La he encontrado en los contornos de Cárdenas.

I have compared an adult male and an adult female of *verbenata* Hagen from Havana, taken by Baker; and one male from Rio, Brazil, one female from Cuba, taken by Gundlach, 1866, of *attala* Selys (as I have understood these two species)⁴⁷ with Gundlach's description. His account of the male applies almost equally well to *verbenata* ♂ and to *attala* ♂, that of the female better to the ♀ of *verbenata*. Gundlach, however, does not give any dimensions of his own specimens, does not describe the shape of the abdomen, nor does he say anything of the wings, so that it is not certain on which species he actually based his description. His description of the female appears to be inaccurate, even allowing for his usual view that the abdomen consists of twelve segments, when he says: "los 8o. y 10o. [segmentos abdominales] tienen una mancha ceniciento-olivada, interrumpida por la línea intermedia, negra; siendo el principio de cada segmento pardo-olivado; los dos últimos segmentos son negros"; . . . It is the last three (eight, nine and ten of the usual nomenclature) that are blackish.

In his synonymy he follows Hagen (1875) in uniting *attala* Selys and *verbenata* Hagen, and, after giving his own description, discussed above, says: "Estas son las descripciones tomadas de ejemplares vistos y clasificados por el Sr. Hagen como *L. verbenata*, pero la descripción dada por Hagen en su Synopsis difiere, pues traducida es" [and then follows a translation into Spanish from p. 162].

"El Sr. Selys Longchamp da la descripción como sigue en la obra de la Sagra:" [What follows is a translation of Hagen's paraphrase (1861, p. 172) of Selys' description in the French edition of de la Sagra, p. 445; whether it is a verbatim copy of the description in the Spanish edition I can not say.]

On the basis of my description⁴⁸ of Burmeister's type of *Libellula plebeja*, Dr. Ris⁴⁹ refers *verbenata* Hagen to *plebeja* Burmeister. He is probably correct.

⁴⁷ Biología Centr.-Amer., Neur., p. 330.

⁴⁸ Trans. Amer. Ent. Soc., xxv, p. 78.

⁴⁹ Cat. Coll. Zool. Selys, Libell., fasc. xiii, pp. 603-604, 1911.

Género **DYTHEMIS** Hagen

Dythemis rufinervis. (57.) P. 266. June 15, 1889. **Dythemis rufinervis** (Burm.).

Libellula rufinervis Burm.; Selys Cub. p. 187.

Se encuentra en las islas de Cuba, Santo Domingo y Puerto Rico y es especie común.

I have compared one male from Cuba, from Poey, one female from Cuba, from Dohrn, with Gundlach's description and they agree sufficiently well, but in the phrase "una raya lateral en los dos últimos segmentos [abdominales] negruzcas," "dos" should be "tres."

Dythemis frontalis. (84.) P. 267. June 15, 1889. **Scapania frontalis** (Burm.).

Libellula frontalis Burm.; Selys Cub. p. 191.

La he cogido en la sabana de Camarioca y en Rangel (jurisdicción de San Cristóbal) y el Dr. Scudder en la Isla de Pinos.

I have compared one male from Havana, taken by Baker, one female from El Cobre, Cuba, and one male from Kingston, Jamaica, with Gundlach's description and they agree. Nothing is said in the latter, however, of the marked widening of the abdomen in segments six to nine. In the description of the female is the following: "El segmento 11 deja ver solamente dos manchitas mayores superiores y 2 pequeñas laterales [=segment 8]. El último segmento [=segment 10] y los apéndices caudales son negros sin mancha."

Dythemis didyma. (17.) P. 268. June 15, 1889. **Micrathyria hagenii** Kirby.

Libellula didyma Selys Cub. p. 191.

La he cogido en la cercanía de Cárdenas y en Rangel (San Cristóbal).

I have compared one (younger) male from Atoyac, Vera Cruz, Mexico, one (older) male from Samana Bay, San Domingo, and one female from Havana, taken by Baker, with Gundlach's description which is good. By "el tercer segmento [abdominal] en el macho con dos manchitas chicas, en la hembra una grande . . . verde," he evidently means as much of segment two as lies posterior to the transverse carina. Rather puzzling it is that he should write of the seventh segment as the antepenult: "El segmento antepenúltimo tiene dos manchas mayores casi cuadradas de un color verde-mar."

See the remark under the following species.

Dythemis dicrota. (139.) P. 269. June 15, 1889. **Micrathyria didyma** (Selys).

Se encontró cerca de Cárdenas. También en la Isla de Pinos y en la Isla de Puerto-Rico.

I have compared one male from Tekanto, Yucatan, and one female from Havana, taken by Baker, with Gundlach's description and they agree. The male which Gundlach describes was not yet pruinose, its markings, therefore, being very similar to those of the female. The numeration of the abdominal segments is that usually adopted by authors, as he says: "el 7o. con una [mancha] grande casi cuadrada dividida por la línea intermedia amarillento-verdes."

Gundlach's descriptions do not permit one to decide whether his *didyma* is the same as the true *didyma* Selys or whether his *dicrota* is really *didyma*. As he refers his *didyma* and *dicrota* to the *didyma* and *dicrota* of Hagen 1861, respectively, and as Hagen stated⁵⁰ that his *dicrota* of 1861 is the true *didyma* Selys, it is, perhaps, more likely that *didyma* Gundlach = *hagenii* Kirby and *dicrota* Gundlach = *didyma* Selys.

Dythemis aequalis. (42.) P. 270. June 15, 1889. **Micrathyria aequalis** (Hagen).

Encontrada en los contornos de Cárdenas.

I have compared one male from Teapa, Tabasco, Mexico, and one female from Cuba, sent by Poey, with Gundlach's description and they agree; here also his numeration of abdominal segments is the usual, although he says: "el segmento 7o. ó antepenúltimo con 2 manchas mayores triangular amarillas (la base del triángulo está en la base del segmento)"; . . .

Dythemis naeva. (75.) P. 271. June 15, 1889. **Erythrodiplax berenice naeva** (Hagen).

Cogida en la vecindad de Cárdenas.

I have compared two males from Colon, Panama, and one female from Cuba, sent by Poey, 1863, with Gundlach's description which agrees, after making allowances for differences in age, except that in the males it is the last three abdominal segments instead of "los dos últimos" which lack the orange or yellow spots.

Dythemis debilis. (41.) P. 272. June 15, 1889. **Micrathyria debilis** (Hagen).

Observada en la vecindad de Cárdenas.

⁵⁰ Proc. Bost. Soc. Nat. Hist., xviii, p. 75, 1875.

I have compared one male from Puerto Barrios, Guatemala, one male from Frontera, Mexico, taken by Westcott, and one female from Alta Mira, Tamaulipas, Mexico, taken by Hoag, with Gundlach's description and they agree; here also he describes the seventh abdominal segment as "el segmento antepenúltimo."

Género **MACROTHEMIS** Hagen

Macrothemis celeno. (28.) P. 273. Nov. 15, 1889. **Macrothemis celeno** (Selys).

Libellula celeno Selys. Cub. p. 192.

De Cárdenas. Parece que vive también en Santo Domingo y en la isla Santómas.

I have compared one male and one female from Cuba, sent by Poey, and one male and one female from Havana, taken by Baker, with Gundlach's description. The sign "♀" on p. 273 should be changed to ♂, "Boca negra" is to be modified; in "Abdomen negro, 1.er segmento con cuatro manchas redondas blanco-verdosas," "1.er" should be "2o." and in the brief description of the female on p. 274, "no" before "tener" should be struck out; these corrections have been made in the German version of Gundlach's description.⁵¹

Género **ERYTHEMIS** Hagen

Erythemis furcata. (...) P. 274. Nov. 15, 1889. **Cannacria** (= **Brachymesia**) **furcata** (Hagen).

No he observado la especie, qué fue colectada por el Barón von Osten Saiken [sic].

Traduzco la descripción dada por Hagen en Syn. p. 169.

There is at least one male from Cuba, sent by Poey, in the Museum of Comparative Zoology, cited in the Biologia Centrali-Americana.⁵²

Erythemis longipes. (13.) P. 275. Nov. 15, 1889. **Ephidatia longipes cubensis** (Scud.).

En los contornos de Cárdenas. También en la Isla de Pinos.

I have compared one male from Havana, taken by Baker, and one female from Cuba, sent by Poey, with Gundlach's description and they agree. This form appears as *Ephidatia longipes cubensis* (Scudder) in Ris.⁵³

⁵¹ Stett. Ent. Zeit., xxix, p. 281, 1868.

⁵² Neur., p. 326.

⁵³ Cat. Coll. Zool. Selys, Lib., fasc. xvi, p. 1013, 1913.

Género **MESOTHEMIS** Hagen

Mesothemis simplicicollis. (123.) P. 275. Nov. 15, 1889. **Erythemis simplicicollis** (Say).

Libellula caeruleans Ramb.; Selys Cub. p. 189.

La he cogido en Cárdenas, Bemba, y Scudder en la Isla de Pinos.

I have compared one male from Cuba (Poey), one male from Jamaica (Johnson) and one female from Eleuthera, Bahamas (Univ. of Pa. Exped.) with Gundlach's description and they agree.

Mesothemis mithra. (66.) P. 276 Nov. 15, 1889. **Erythemis attala** (Selys).

Libellula mithra Selys Cub. p. 188.

Cogida en los contornos de Cárdenas.

I have compared one male from Presidio, Vera Cruz, Mexico (Barrett), one female from Cuba (Gundlach, 1866) and one female from Havana (Baker) with Gundlach's description and they agree, although the latter does not even mention the wings.

This is the *Erythemis attala* of the Biologia Centrali-Americana and of Dr. Ris.⁵⁴

Género **DIPLAX** Charp.

Diplax ochracea. (19.) P. 277. Nov. 15, 1889. **Erythrodiplax ochracea** (Burm.).

Cogida en la vecindad de Cárdenas, en la Isla de Pinos y en la Isla de Puerto Rico.

I have compared one male and one female from Havana (Baker) with Gundlach's description, which does not mention the sex of his specimens, but was evidently based on non-adults (if males, at least, were used), as evidenced by such expressions as "Tórax verdoso-pajizo," of which color also the "Abdomen en los tres primeros segmentos . . . [y] los dos últimos segmentos y sus apéndices" are said to be. This applies fairly well to the 10th segment and to the appendages, but not to the 9th which is darker, brown, in dried specimens. Otherwise the description agrees.

This is the form called *Erythrodiplax ochracea ochracea* by Dr. Ris.⁵⁵

Diplax abjecta. (21.) P. 278. Nov. 15, 1889. **Erythrodiplax connata** (Burm.).

Cogida en los alrededores de Cárdenas y en la Isla de Pinos.

⁵⁴ Cat. Coll. Zool. Selys.

⁵⁵ Cat. Coll. Zool. Selys, Lib., fasc. xii, p. 488, 1911.

I have compared one male from Cuba, Gundlach, 1864, 21, with Gundlach's description [of the male as fixed by "frente y vértice con un brillo de azul de acero," sex not mentioned]. This male is a little smaller than the dimensions copied by Gundlach from Hagen (1861), viz.: total length 34 *vs.* 38 mm., alar expanse 55 *vs.* 58, pterostigma 3 *vs.* 3.5, and the colors of the abdomen are less vivid, but very likely this latter difference is due to the description having been made from freshly-caught examples.

This male and one from Bath, Jamaica, are the only material from the West Indies now at hand which I referred to *Erythrodiplax connata a'* in the Biologia Centrali-Americana.⁵⁶ They agree in most respects with the *E. connata fraterna* of Dr. Ris,⁵⁷ but they have no *brown at the apices of the wings*, a feature on which Dr. Ris lays emphasis (p. 498) in distinguishing this Antillean form.

Diplax Justiniana. (...) P. 279. Nov. 15, 1889. **Erythrodiplax connata justiniana** (Selys).

Libellula Justiniana Selys Cub. p. 190.

Gundlach's remarks on this species consist only of a Spanish version of de Selys' description and a note on Hagen's usage of the name *justiniana*.

Diplax ambusta. (130.) P. 279. Nov. 15, 1889. **Erythrodiplax connata justiniana** (Selys).

Observada en varios puntos de las islas de Pinos y en Puerto Rico.

I have compared one male and one female from Cuba (Poey), one young male from Bath, Jamaica, and one female from Havana (Baker) with Gundlach's description and they agree.

This is the *Erythrodiplax connata f'* of the Biologia Centrali-Americana⁵⁸ and the *E. connata justiniana* of Dr. Ris.⁵⁹

Género **PERITHEMIS** Hagen

Perithemis domitia. (14.) P. 280. Nov. 15, 1889. **Perithemis domitia domitia** (Drury).

Libellula metella Selys Cub. p. 190.

El Dr. Hagen no está aún seguro si la especie cubana es ó no es igual á la nombrada por Drury *Libellula domitia* en Illust. II 83; pl. XIV, f. 4, y mencionada con el mismo nombre por Burm. II, 855, 40 y Ramb. 124, 132, y así aceptó

⁵⁶ Neur., p. 264.

⁵⁷ Cat. Coll. Zool. Selys, Libel., fasc. xii, p. 508, 1911.

⁵⁸ Neur., p. 266.

⁵⁹ Cat. Coll. Zool. Selys, Libel., fasc. xii, p. 509.

el nombre usado por Selys en la obra de la Sagra. [This probably refers to *P. metella*.]⁶⁰ Si fuese igual debía tener el nombre dado por Drury.

Gundlach quotes no localities for this species but gives a description of both sexes; I have compared one male from Cuba (Poey) and one female from Cuba (ex coll. Needham) with it and the males agree. The description of the wings, as usual, is a translation of Hagen (1861). The female before me was not included in the material cited in the *Biologia Centrali-Americana*,⁶¹ as the male was; it has no "estrias morenas" at the base of the wings, although the yellow in the subcostal space of the front and hind wings and the submedian (cubital) space of the hind pair is a little deeper. The general yellow of the wings extends to the second postnodal for the whole width on both front and hind pairs and in the costal space only as far as the stigma. The extreme apex of the hind wings is brownish yellow for a width of one cell. Internal triangle, front wings, two-celled, the two posttriangular rows increase to three rows at the level of the separation of the bridge vein (subnodal sector) from M1 (principal sector) and so continue almost to the wing-margin. This female is of the form *domitia* (type) of the *Biologia Centrali-Americana*,⁶² its wing coloration resembles more that of fig. 183 of "*P. domitia* var. ♀ *octoxantha* Buenos Aires" of Ris than his fig. 180 of "*P. domitia* var. *domitia*, Cuba."⁶³

At the conclusion of his description of this species, Gundlach says: "Hay una variedad con las alas cristalinas, casi amarillentas y en su borde anterior amarillas; las posteriores en la hembra con una nube morena en el ápice. Esta variedad había nombrado Hagen *Libellula iris*." Hagen in his original and only description of *iris*⁶⁴ did not cite it from Cuba.

ON *ENALLAGMA TRUNCATUM* GUNDLACH AND ITS ALLIES IN THE UNITED STATES

The species described as *Agrion* (*Enallagma*) *truncatum* by Gundlach on page 226 of Tomo II of his *Contribución* is known to me from a single male only. In most respects, this male seems related to *E. pollutum*, *signatum* and *pictum* of the eastern United

⁶⁰ Proc. Bost. Soc. Nat. Hist., xi, p. 293, 1867.

⁶¹ Neur., p. 313.

⁶² Neur., pp. 310, 312.

⁶³ Cat. Coll. Zool. Selys, Libel. fasc. xi, pp. 337, 335, 1910.

⁶⁴ 1861, pp. 185, 186.

States. Under *E. pollutum*, following, perhaps, my identification of this species in these Transactions,⁶⁵ American authors have included at least three species. One of these, the best known, is that found from Maine, Ontario, and Wisconsin to Florida and Oklahoma; it is not the true *pollutum* but distinct and may be termed *Enallagma vesperum*. The true *pollutum* I know from Florida only. For a third form, likewise seen from Florida alone, I suggest the name *Enallagma laurenti*.

Of the six species thus resulting, I know both sexes of four, the males only of *truncatum* and *laurenti*. These six species agree in having (in the sexes thus far known):

♂ ♀. Dorsum of abdominal segment two black from end to end.

Right and left pale postocular spots connected with each other across the occiput.

Mesostigmal lamina (caudal mesostigmal plate of Garman, 1917) erect and more or less (*truncatum*) produced at its mesal end into a tubercle. In the males the lamina does not reach to the mesinfraepisternum, owing to the ventral mesostigmal plate (of Garman) meeting the mesepisternum (supraepisternum of Garman); in the females the lamina reaches to the mesinfraepisternum and the ventral mesostigmal plate does not meet the supraepisternum.

First antennal joint anteriorly for its entire length and all of the second joint, except the distal end, pale colored.

Legs pale colored, dark markings, when present, narrow lines often interrupted.

♂. Dorsum of abdominal segment nine (but not of eight) pale blue or orange (black in *pictum*). Superior abdominal appendages not deeply bifid.

♀. Middle prothoracic lobe with a pair of dorsal pits. Dorsum of abdominal segment ten pale-colored (black in *pictum*).

The pair of dorsal pits on the middle prothoracic lobe of these females does not appear to have been noticed by previous writers. Each pit is oval or elliptical in outline, its greatest diameter being subtransverse to the long axis of the body (plate XXXIII, figs. 5 and 7). The shortest diameter, as far as measured, varies from .07 mm. in *pollutum* to .2 mm. in *signatum*, and varies also in the same species. Thus, in *signatum* it ranges from .1 to .2 mm. in three

⁶⁵ xx, 239, 1893.

specimens measured. Each pit is smooth within, shining black and its external or lateral end usually produces an emargination on the inner or mesal edge of the pale spot present on each side of the dorsum of this lobe.

The usual statement is that in the pairing of the Zygoptera the inferior appendages of the male are applied cephalad of the hind prothoracic lobe of the female, his superior appendages caudad of that lobe. If this be true for the species here discussed, these dorsal pits of the female may receive the inferior appendages of the male. Since the former are much larger than the apices of the latter (*cf.* figs. 5 and 7 with 16, 17 and 20, 21, plate XXXIII), the adaptation does not appear to be very exact.

Enallagma cultellatum, although suggesting the *pollutum-truncatum* group by the superior appendages of the male, has the black on the dorsum of abdominal segment two not reaching to the base, the pale postocular spots not connected, the mesostigmal lamina not so ridge-like and without any mesal tubercle, abdominal segments eight and nine both pale blue dorsally in the male.

The female of *E. cultellatum* has a pair of pits on the middle prothoracic lobe, but they are much smaller and shallower than in the other species here discussed and are situated nearer to the hind lobe, which latter is quite different from the hind lobe of our species in question being trilobulate instead of entire, the middle lobule a little posterior to the lateral two and with a horizontal ridge projecting from its hind surface.

The following pages give the chief differentials of these six species. The dimensions of the width of the various stripes on the thorax refer in each case to the width at *mid-height*. Only in the cases of *pollutum*, *laurenti* and *vesperum* does it seem desirable to quote the existing literature.

The males may be distinguished by the form of the terminal abdominal appendages, shown on Plate XXXIII, figs. 12-23, and by the following color differences:

Dorsum of abdominal segment nine pale blue or orange.

Pale postocular spots directly confluent with the pale color of the rear of the head, middle prothoracic lobe predominantly pale on dorsum. . . **laurenti**

Pale postocular spots not directly confluent with the pale color of the rear of the head, although they may be indirectly confluent therewith *via* the pale transverse stripe which connects the postocular spots with each other; middle prothoracic lobe predominantly black on dorsum.

Pale antehumeral stripe narrower than the black humeral (mesopleural) stripe.

Postocular spots linear. **truncatum**

Postocular spots cuneiform. **pollutum**

Pale antehumeral stripe as wide as, or wider than, the black humeral stripe. **vesperum, signatum**

(I have not found a constant color difference between the males of these two species, that given by Garman in 1917 notwithstanding, although the bright lemon yellow of the sides of the thorax in the adult males of *vesperum* is apparently never met in any age of *signatum*, but younger males of *vesperum* do not show this bright yellow; the difference in the appendages of the two species is well marked.)

Dorsum of abdominal segment nine black, pale postocular spots linear, not confluent with the pale color of the rear of the head, pale antehumeral stripe narrower than the black humeral stripe. **pictum**

Females.

(Those of *laurenti* and of *truncatum*, being unknown to me, are omitted.)

Black humeral stripe at its lower end touching the external or lateral end of the mesostigmal lamina.

Pale postocular spots linear, pale antehumeral stripe narrower than the black humeral stripe, second lateral thoracic (metapleural) suture with a black stripe on its upper two-thirds or three-fourths, mesepisternal tubercles present. **pictum**

Pale postocular spots cuneiform, wider and rounded at their lateral ends. Mesepisternal tubercles present, pale antehumeral stripe as wide as, or wider than, the black humeral, second lateral thoracic suture with a dark stripe of variable length. **signatum**

Mesepisternal tubercles absent, pale antehumeral stripe narrower to wider than the black humeral, second lateral thoracic suture with a black stripe on its upper five-sixths or more. **pollutum**

Black humeral stripe at its lower end not touching the lateral end of the mesostigmal lamina, pale postocular spots cuneiform, pale antehumeral stripe wider than the black humeral, second lateral thoracic suture with a black stripe on its uppermost fourth or fifth only, mesepisternal tubercles present but variable in size. **vesperum**

Enallagma truncatum Gundlach (Plate XXXIII, figs. 1, 12, 13; plate XXXIV, figs. 24, 25.)

Agrion (Enallagma) truncatum Gundlach, Contrib. Ent. Cub., ii, 226, 1888. (Reprinted *antea*, page 353).

♂. Superior appendages in profile view, with the apical margin twice as long as the inferior margin and convex in the middle of its length with a slight concavity above and a slighter one below the convexity; in dorsal view, the intero-inferior lamella not reaching to the level of the supero-internal sub-apical hook.

Nasus (post-clypeus) shining black, two transverse linear streaks on the disk and anterior and lateral margins narrowly orange.

Frons: pale color of its anterior surface not attaining the median ocellus;

no small yellow spot enclosed in black immediately anterior to the median ocellus.

Pale postocular spots linear, not confluent with the pale color of the rear of the head.

Middle prothoracic lobe in dorsal view black, an oval orange spot each side.

Width of black mid-dorsal thoracic stripe .52, of pale antehumeral stripe .14, of black humeral stripe (stripe on mesopleural suture of Garman 1917) .42 mm.

Second lateral thoracic suture (metapleural suture of Garman) with a black stripe for almost its whole length.

Abdomen 22.5, hind wing 12.5, costal edge of stigma, front wing, .56 mm.

Anal vein (anal bridge of Tillyard 1917) separating from the hind margin of the wings at least as far proximad to Cu-A (anal crossing of Tillyard) as the latter is long. M2 arising on the front wings proximad to the fourth postnodal, on the hind wings at the third, M1a nearest the seventh on the left front wing, nearest the sixth on the other three wings.

Material examined: Cuba, Poey, 1864, 1 ♂ (M. C. Z.).

Enallagma signatum (Hagen) (Plate XXXIII, figs. 14, 15.)

Agriion signatum Hagen, Syn. Neur. N. Am., 84, 1861.

♂. Superior appendages in profile view, with the apical margin subequal to, to six-fifths as long as, the inferior margin, a small tooth where these two margins meet, apical margin nearly straight; in dorsal view, the intero-inferior lamella not reaching to the level of the supero-internal subapical hook.

Nasus shining black, two transverse linear streaks (absent in some) on the disk and anterior and lateral margins narrowly yellow or blue.

Frons: pale color of its anterior surface not attaining the median ocellus; a small yellow spot enclosed in the black anterior to the median ocellus.

Pale postocular spots cuneiform, orange or blue, not confluent with the pale color of the rear of the head.

Middle prothoracic lobe in dorsal view black, a subsemicircular spot each side and a median twin spot (absent in some) yellow or blue.

Width of black mid-dorsal thoracic stripe .63-.7, of pale antehumeral .35-.42, of black humeral .24-.35 mm.

Second lateral thoracic suture with a blackish brown stripe or line for the uppermost fourth to three-fourths of its length.

♀. Lateral (external) end of mesostigmal lamina black.

A mesepisternal tubercle at the antero-mesal angle of the pale antehumeral stripe.

Width of the black mid-dorsal thoracic stripe .63-.7, of pale antehumeral .35-.42, of black humeral .28-.42 mm.

Second lateral thoracic suture with a narrow dark brown stripe on its uppermost third to upper three-fourths, continued ventrad in some by a very fine dark line.

Black on dorsum of abdominal segment nine usually narrowed caudad.

Abdomen ♂ 26-27, ♀ 24.5-27; hind wing ♂ ♀ 15.5-17; costal edge of stigma, front wing, ♂ .63-.7, ♀ .67-.77 mm.

Material examined: 8♂, 7♀, Maine, New Jersey, Pennsylvania and Indiana.

This species has been recorded from as far south as Georgia and Louisiana. No attempt has been made to study this well known species exhaustively.

Enallagma pollutum (Hagen) (Plate XXXIII, figs. 2, 5, 6, 16, 17; plate XXXIV, fig. 26.)

Agrion pollutum Hagen, Syn. Neur. N. Am., 83, 1861.

Enallagma pollutum Selys, Bull. Acad. Belg., (2), xli, 527, 1876.

Calvert, Trans. Amer. Ent. Soc., xx, 239, 1893 (in part only).

♂. Superior appendages in profile view, with the apical margin subequal to the inferior margin, concave; in dorsal view, the intero-inferior lamella not reaching as far caudad as the level of the supero-internal subapical hook.

Nasus black, without pale markings except the narrow yellow or orange margins.

Frons: pale color of the anterior surface not attaining the small yellow or orange spot immediately anterior to the median ocellus.

Pale postocular spots cuneiform, not confluent with the pale color of the rear of the head.

Middle prothoracic lobe in dorsal view predominantly black, a yellow or orange spot each side, no median twin spots or stripes.

Width of black mid-dorsal thoracic stripe .53-.63, of pale antehumeral .25-.28, of black humeral .37-.42 mm.

Second lateral thoracic suture with a black stripe on the upper five-sixths or more of its length.

♀. Lateral end of mesostigmal lamina pale, margined with black of the humeral stripe which extends slightly on to the lamina.

No mesepisternal tubercles.

Width of the black mid-dorsal thoracic stripe .56-.63, of the pale antehumeral .28-.42, of the black humeral .28-.35 mm.

Second lateral thoracic suture with a black stripe on the upper five-sixths or more of its length.

Black on dorsum of abdominal segment nine of almost uniform width from anterior to posterior edge of segment.

Abdomen ♂ 23-26, ♀ 23.5-26; hind wing ♂ 13-16.5, ♀ 15.5-19; costal edge of stigma, front wing, ♂ .42-.7, ♀ .52-.7 mm.

Material examined: Florida (no precise locality), 2♂, 2♀, (Acad. Nat. Sci. Phila.). Enterprise, April 16, P. Laurent, 1♀, (Acad. Nat. Sci. Phila.). Charlotte Harbor, Mrs. A. T. Slosson, 1♂, in her coll. Miami, March 27, April 3 and 4, 1901, P. Laurent, 2♂, 1♀, (Acad. Nat. Sci. Phila.). Biscayne Bay, Mrs. A. T. Slosson, 1♂, 1♀, in her collection. All these localities are in Florida.

The female from Enterprise has longer hind wings (19 mm.) than any other seen; these, its locality and date of collection render it *a priori* likely that it is conspecific with the male from the same

place described below as *E. laurenti*, but in all other (color) respects it agrees with true *pollutum* females.

Mrs. Annie Trumbull Slosson has recalled the delightful correspondence of earlier days by lending to me again the specimens from Florida in her collection which I had identified years ago.

Mr. C. H. Kennedy, at my request, has studied and made drawings of the penes of the males of *pollutum*, *laurenti* and *vesperum* from which drawings of the abdominal appendages had been made by myself. His drawings are reproduced as figures 24 to 30 of plate XXXIV. Neither Mr. Kennedy nor I have investigated the amount of variation in this organ which may exist within the species. These figures are not offered, therefore, as specific criteria, although they may be such; they will, at least, aid in fixing the identity of the type specimens for future researches.

Mr. Nathan Banks has kindly compared drawings of the appendages and notes on the color-differences of *pollutum*, *laurenti* and *vesperum* with Hagen's type of *pollutum* in the Museum of Comparative Zoology, and confirmed the identity with the species here given that name. He adds that the apical margin of the superior appendages of the male type of *pollutum* is "more evenly curved than your figure and the two processes are further apart. Above it looks like your figure."

Enallagma laurenti new species (Plate XXXIII, figs. 4, 18, 19; plate XXXIV, figs. 27, 28.)

Enallagma pollutum Castle & Laurent, Ent. News, vii, 302, 1896 (male = type).

♂. Superior appendages in profile view, with the apical margin subequal to the inferior margin, convex; in dorsal view, the intero-inferior lamella reaching beyond the level of the supero-internal subapical hook.

Nasus orange, traces of a faint black transverse line on each side.

Frons: pale color of the anterior surface attaining the median ocellus.

Pale (yellow) postocular spots largely confluent with the yellow of the rear of the head.

Middle prothoracic lobe orange or yellow, a transverse black stripe along its hind margin, where it joins the hind lobe, from which extends forward on each side an indistinct longitudinal blackish or dark brown line.

Width of black mid-dorsal stripe .35-.42, of pale antehumeral .49-.56, of black humeral from a mere line (type) to .10 mm. (The larger dimension given for the first two stripes is that of the type.)

Second lateral thoracic suture with a black stripe or line on its uppermost fourth only.

Labrum orange with three basal black points, one median, one right lateral,

one left lateral. Mandibles, labium and first two antennal joints yellow. There is a black spot at the latero-ventral angle of the pale postocular spots; elsewhere they are confluent with the yellow of the rear of the head.

Fore and hind prothoracic lobes, thorax (except for the black stripes and lines mentioned above, and a black line on the upper end of the obsolete first lateral suture in the type but not in the paratype) sides of abdominal segments one to eight (becoming blue on the posterior of these) and transverse basal rings on three to six yellow; nine and sides of ten blue, dorsum of one to eight and of ten black.

Anal bridge (Tillyard) separating from the hind margin proximal to Cu-A for a distance equal to (type) or shorter than (paratype) the length of the latter; M2 arising near the fifth (front wings) or fourth (hind) postnodal; M1a arising at eighth (front wings, seventh in left wing of paratype) or seventh (hind) postnodal.

Abdomen 30 (type) -26, hind wing 19 (type) -16, costal edge of stigma, front wing, .63 (type) -.56 mm.

Material examined: Type, 1 ♂, Enterprise, Florida, April 15, taken by P. Laurent, in the collection of the Amer. Ent. Soc. (Acad. Nat. Sci. Phila.). *Paratype*, 1 ♂, Crescen[t] City, Florida, collection C. V. Riley (United States National Museum (head lacking)).

The type has a pair of small pits on the middle prothoracic lobe, similar to those possessed by the females of this group, but smaller; each pit is just lateral to the dark longitudinal line, measures .08 x .04 mm., its greatest dimension obliquely transverse to the main axis of the body, and is very shallow. Since the paratype does not have these pits and since I have found a single male each of *signatum* and of *vesperum* with pits, I regard their presence in males as indicating a partial gynandromorphism, as in all other respects these three individuals appear to be completely male.

This species is dedicated to the collector of the type, Mr. Philip Laurent, of Philadelphia, to whom, during many years, I have been indebted for specimens of Odonata.

Mr. Rolla P. Currie, of the U. S. Bureau of Entomology, has kindly placed the paratype at my disposal for study.

Enallagma vesperum new species (Plate XXXIII, figs. 3, 7-11, 20, 21; plate XXXIV, figs. 29, 30.)

The following literature refers to this species under the name of *Enallagma pollutum*:

- 1892. Harvey, Ent. News, iii, 91 (Chemo Stream, Bradley, Maine).
- 1893. Calvert, Trans. Amer. Ent. Soc., xx, 239, pl. iii, fig. 27 (♂ apps.) (in part, Maine).
- 1894. Wadsworth, Ent. News, v, 132 (Lake Cobbosseecontee, Maine).
- 1895. Kellicott, Journ. Cincinnati Soc. Nat. Hist., xvii, 206 (Sandy Beach near Lakeside and Licking Reservoir, Ohio).

1899. Id., Odonata Ohio, 46, fig. 13 (♂ apps.) (Ohio).
1900. Williamson, 24th Rep. State Geol. Indiana, 276, pl. v, figs. 23, 24 (♂ apps.) (Simonton, Round and Shriner lakes, Indiana).
1900. Calvert, 27th Ann. Rep. N. Jersey State Board Agric. 1899, 69 (Clementon, New Jersey).
1903. Calvert, Ent. News, xiv, 35 (Lake Hopatcong, New Jersey).
1903. Needham, Bull. 68 N. York State Mus., 258, pl. 19, fig. n (♂ apps.) (Illinois). Calvert, *t. c.*, 277 (Black lake, Sullivan County, N. York).
1908. Muttkowski, Bull. Wisconsin Nat. Hist. Soc., vi, 78 (Little Cedar Lake, Wisconsin).
1908. Needham, Rep. Geol. Surv. Michigan 1907, 265 (Walnut Lake, Michigan).
1911. Muttkowski, Bull. Wisconsin Nat. Hist. Soc., ix, 35 (North Hudson, St. Croix County, Wisconsin).
1913. Davis, Journ. N. York Ent. Soc., xxi, 17 (Yaphank, New York).
1914. Williamson, Ent. News, xxv, 446 (Wister, Oklahoma).
1916. Howe, Psyche, xxiii, 14 (Concord, Massachusetts).
1917. Howe, Psyche, xxiv, 50 (Moultonboro, New Hampshire).
1917. Garman, Bull. Illinois State Lab. Nat. Hist., xii, 550, pl. lxxi, figs. 186, 193 (♂ apps.) (Lake Villa, Illinois).
1917. Howe, Mem. Thoreau Mus. Nat. Hist., ii, 18, fig. (♂ apps.).
1918. Howe, *t. c.*, 39 (West Peabody, Brookline and Bedford, Massachusetts).
1919. Howe, *t. c.*, 65 (Wakefield, Mass.).

♂. Superior appendages in profile view, with the apical margin one and one-half times as long as the inferior margin, convex; in dorsal view, the intero-inferior lamella reaching beyond the level of the supero-internal sub-apical hook.

Nasus black, its margins and transverse spots or stripe on the disk yellow or orange.

Frons: pale color of the anterior surface sometimes reaching the small yellow or orange spot immediately anterior to the median ocellus and indenting the black of the superior surface more deeply than in *pollutum*.

Pale postocular spots not confluent with the pale color of the rear of the head.

Middle prothoracic lobe in dorsal view with black usually predominating, a spot each side and often also a pair of short submedian lines or stripes, yellow or orange.

Width of black mid-dorsal thoracic stripe .28-.67, of pale antehumeral .35-.7, of black humeral, from a mere line to .28 mm.

Second lateral thoracic suture with a black stripe on its uppermost fourth or fifth only.

♀. Lateral end of mesostigmal lamina not margined with the black of the humeral stripe but having a black spot on itself.

Mesepisternal tubercles of varying size present, at the antero-mesal angle of the pale antehumeral stripe, in some almost as well marked as in *signatum*.

Width of the black mid-dorsal thoracic stripe .33-.63, of pale antehumeral .42-.63, of black humeral, from a mere line to .14 mm.

Second lateral thoracic suture with a black stripe on its uppermost fourth or fifth only.

Black on dorsum of abdominal segment nine narrowing caudad, reaching or not reaching the hind margin of the segment.

Abdomen ♂ 24-28.5, ♀ 24-28; hind wing ♂ 15.5-18, ♀ 18-19; costal edge of stigma, front wing, ♂ .46-.7, ♀ .7-.84 mm.

Variations. The extent of black and of yellow (or orange) on the *nasus* varies greatly, even in specimens taken at the same locality on the same day. Thus, all the patterns shown in figures 3, 8 to 11, plate XXXIII, are represented in the males from Black Lake, New York, August 2, 1898, while still another male from the same place and date has the basal black line broken into a median and two lateral pieces, the median piece connected by a very fine black line with the submarginal black stripe. The single males from Toronto, Ontario, and from Palm Beach, Florida, have the nasal and frontal patterns very nearly as in figure 9. The male from Simonton Lake, Indiana, has the *nasus* similar to figure 9, except that the submarginal black stripe is asymmetrically divided into two short stripes. One Bluffton male has the basal black line represented by three dots, the two lateral dots each connected narrowly with the submarginal black stripe, which latter consists of a median dot and a lateral streak each side; the other Bluffton males have the nasal pattern as in figures 3, 8 and 9. The submarginal black is broken into three sections in the male from Rome City, Indiana, and one from Clementon, New Jersey; in them the basal black stripe is continuous and is connected with the respective lateral sections of the submarginal black stripe. In the four Bluffton females, the nasal pattern is as in figures 3, 9 or 10, in the three females from Pemigewassett Pond, New Hampshire, as in figure 3.

The most frequent *frontal pattern* in the males is that of figure 3. It also varies in the same locality, *e. g.*, Black Lake (*cf.* plate XXXIII, figures 8 to 11). The pale color of the anterior frontal surface may reach the yellow spot in front of the median ocellus on one side only (right—Oklahoma, left—one Bluffton) and not on the other; in one instance in which it reaches the spot on both sides, the transverse line which remains is broken into two short isolated black lines (one Bluffton male). The most frequent frontal pattern in the females is that of figure 10.

The pale spot lying immediately anterior to each lateral ocellus (*cf.* figure 3) varies from complete absence (one male, Hurdstown River) to a size greater in diameter than that of an ocellus.

The dorso-lateral pale spot on the disk of the middle prothoracic lobe is sometimes confluent with the pale color of the lateral surface (Simonton Lake ♂, 4♂, 3♀ Bluffton, Rome City ♀, Sawkill Pond ♂, 1♂ Clementon, 1♂ Black Lake), or confluent with the pale submedian stripes (Rome City ♂, Oklahoma ♂, Angola ♀). The pale submedian stripes may be absent (3♂ Pemigewassett, 1♂ Clementon, River Styx ♂, 2♂ Hurdstown River, 1♂ Black Lake).

The black eighth abdominal segment of the male frequently has its hind margin, caudad of the anteapical spinules, narrowly blue. The blue ninth

segment may have a small black spot on each side in dorsal view (Bradley ♂, 1 ♂ Kent, Ohio, 1 ♂ Bluffton, 4 ♂ Pemigewassett, 1 ♂ Black Lake); a mid-dorsal black mark may be present on the hind margin in addition to, or in the absence of, these paired black spots.

The variations in certain features of the venation are shown in the following table:

Front Wings		38 ♂♂	9 ♀♀
M2 arising nearest the 5th postnodal	.....	83.0%	83.3%
" " " 4th "	.....	7.8	5.6
" " " 6th "	.....	5.2	
" between " 5th & 6th postnodals	.....	2.6	11.0
	(Lost ...	1.3	
Hind Wings			
M2 arising nearest the 4th postnodal	.....	79.0%	77.7%
" midway between the 4th & 5th postnodals	.....	7.8	16.6
" nearest the 5th postnodal	.....	7.8	5.6
" " " 3rd "	.....	5.2	
Front Wings			
M1a arising nearest the 7th postnodal	.....	42.0%	27.7%
" " " 8th "	.....	38.0	66.6
" " " 9th "	.....	13.0	5.6
" " " 6th "	.....	2.6	
" between " 6th & 7th postnodals	.....	1.3	
	(Lost ...	2.6	
Hind Wings			
M1a arising nearest the 7th postnodal	.....	52.6%	27.7%
" " " 8th "	.....	36.7	72.2
" " " 6th "	.....	9.1	
" between " 6th & 7th postnodals	.....	1.3	

Material examined: Type, 1 male, Chemo Stream, Bradley, Maine, July 21, 1891, taken by F. L. Harvey, in the writer's collection (Academy of Natural Sciences of Philadelphia). *Paratypes:* New Hampshire, Pemigewassett Pond, Meredith Township, Belknap County, July 9-23, 1917, P. P. Calvert, 4 ♂, 3 ♀. Connecticut, New Haven, June 23, 1904, H. L. Viereck, 1 ♀, (Acad. Nat. Sci. Phila.). New York, Black Lake, Sullivan County, August 2, 1898, P. P. Calvert, 11 ♂. New Jersey, Hurdstown River, September 6, 4 ♂, and River Styx, September 14, 1 ♂, both at Lake Hopatcong, 1902, P. P. Calvert; Clementon, July 22 and September 22, 1899, P. P. C., 2 ♂. Pennsylvania, Sawkill Pond, Pike County, July 19, 1898, P. P. C. 1 ♂; Conneaut Lake, August 8, 1899, D. A. Atkinson 1 ♂ (coll. E. B. Williamson). Ohio, Kent, June 22, 1900, J. S. Hine, 2 ♂. Ontario, Toronto, Grenadier Pond, August 16, 1907, E. M. Walker, 1 ♂. Indiana, Angola, July 16, 1910, E. B. Williamson, 1 ♂, 1 ♀; Simonton Lake, July 30, 1899, R. J. Weith, 1 ♂; Bluffton, June 23, 1907, 2 ♂, 2 ♀, July 24, 1904, 2 ♂, 2 ♀, E. B. Williamson; Rome City, July 28, 1907, 1 ♂, 1 ♀, E. B. Williamson. (The specimens from Ohio, Ontario, Indiana and Oklahoma in Mr. Williamson's coll.) Wisconsin, Washington County, July 29, 1907, 1

(gynandromorphic) ♂. Florida, Palm Beach, November 12, 1911, G. P. Englehart, 1 ♂ (these last 2 ♂ in the Museum of the Brooklyn Institute of Arts & Science). Oklahoma, Wister, June 3, 1907, 1 ♂. Total 38 ♂ ♂, 10 ♀ ♀.

It is a pleasure to acknowledge the aid given by Mr. E. B. Williamson and by Mr. Charles Schaeffer, of the Brooklyn Institute, in lending me specimens from the respective collections under their care, as cited above.

The name *vesperum* is suggested for this species by its habit of flying after sunset to a degree greater than in most of its allies. I observed this at Sawkill Pond and Black Lake in 1898, and at Pemigewassett Pond, July 20, 1917, at 7.50 p. m. Prof. Needham (1908) noted it at Walnut Lake, Michigan, as the "latest flying of all Odonata," and Dr. Howe (1917) writes of it as "semicrepuscular." It does not confine its flight to the evening hours, however, as the River Styx male was taken in the morning. It is found on ponds, flying from leaf to leaf of the floating vegetation.

Larva. Dr. E. M. Walker has described and figured details of supposed nymphs of this species, from Georgian Bay, Ontario.⁶⁶ Garman (1917, p. 553) had nymphs from which adults of this species were reared and says: "It (the nymph) is quite different from the species figured by Walker as *pollutum* ('13; pl. i, fig. 10), and his description also differs from the specimens obtained at Lake Villa," Illinois. Garman gives a description of his nymphs (p. 550).

I have an exuvia from which a male *vesperum* emerged at Pemigewassett Pond, July 15, 1917. This exuvia differs from both descriptions by Walker and Garman, as indicated by the following:

Eyes *not very* prominent laterally, their postero-lateral margins *not forming* a marked excavation with the sides of the head. About thirteen spinules, or short setae, of varying length can be seen on the dorsal surface of each hind angle of the head, these angles not nearly as prominent as in Walker's figure 9, but more like those of his figures 4 or 6. Second antennal joint *longer* (.21 mm.) than the first (.14 mm.); no definite difference in color.

Two mental setae on each side, a third much smaller and more proximal, in addition on the right side only; five setae on each lateral lobe, whose apical margin bears, next to the movable hook, a low convex lobule with about five

⁶⁶ Can. Ent., xlv, 162, pl. i, figs. 9, 10, 1913. Reprinted in Supplement to 47th Ann. Rep. Dept. Marine & Fisheries, Fisheries Branch, Sessional Paper 39b, p. 68, pl. iii, figs. 9, 10, Ottawa, 1915.

denticulations, then three longer distinct teeth and lastly the still longer end hook (thus, apparently, as in Walker's description). Mentum with about four or five setae on its lateral margin just proximal to the articulation with the lateral lobe.

Femora with a very indistinct transverse, anteapical, brown ring, coloring of tibiae very indistinct. Metathoracic wing-covers reaching to the middle of the *fourth* abdominal segment.

Setae on each side of dorsum of abdominal segments increasing in length and in number from segment one (.06 mm., *ca.* 15) to segment three (.14 mm., 50+), thence decreasing on four and five (.1 mm., *ca.* 25); on six to nine a group of shorter, stouter setae (.08 mm. long) at the hind end of the lateral carina. Many other still shorter setae or spinules present on seven to ten, but irregularly distributed, *not* forming rows, transverse or otherwise. No distinct markings on the ventral surface.

Median gill 3.5×1.0 mm., a transversely extended narrow spot of brown pigment at slightly less than mid-length, pigment elsewhere much paler and indefinitely distributed; dorsal and ventral margins each with marginal setae .04 mm. long, not overlapping each other, but separated by intervals as long as the setae themselves, and which extend from the base caudad almost as far on the dorsal margin as the level of the brown spot, on the ventral edge for one-third of the gill's length.

Lateral gills 3.7×1.0 mm., colored similarly to the median gill, but the narrow spot of brown pigment is at a little more than one-half of the gill's length; the marginal spines ($.06 \pm$ mm. long) are confined to the ventral edge, reaching as far as the brown spot and overlapping each other, hence more closely set than on the median gill. (Examined under a Zeiss comp. microsc., oc. 3, obj. A).

On color differences here indicated no great emphasis must be laid, considering that much pigment disappears from the exuvia after moulting.

Enallagma pictum (Plate XXXIII, figs. 22, 23.)

Enallagma pictum Morse, Psyche, vii, 274, 307, 1895 (Sherborn, Massachusetts).

♂. Superior appendages in profile view, with the apical margin two-thirds as long as the inferior margin, slightly bilobed, lower lobe a little larger than the upper; in dorsal view, the intero-inferior lamella reaching to the level of the supero-internal subapical hook.

Nasus orange, a transverse basal black stripe, trilobed distally, the three lobes of varying prominence; or, black predominating, rather broadly margined with orange.

Frons: pale color of its anterior surface not attaining the median ocellus, a mere yellow line bordering the ocellus anteriorly.

Pale postocular spots linear-cuneiform or linear, orange, not confluent with the pale color of the rear of the head.

Middle prothoracic lobe in dorsal view black with metallic green reflections, a small yellow or orange spot (in some absent) each side in the anterior half, sides inferiorly yellow.

Width of black mid-dorsal thoracic stripe .7-.77, of pale antehumeral .28-.35, of black humeral .42-.49 mm.

Second lateral thoracic suture with a black stripe on the upper three-fourths or two-thirds of its length, the stripe continued as a line for the rest of the suture.

♀. Mesostigmal lamina chiefly black, near its hind edge with a yellow line, hence both margined with the black of the mid-dorsal and humeral stripes and with a black spot on itself at its lateral end.

Mesepisternal tubercles present.

Width of the black mid-dorsal thoracic stripe .84-.91, of pale antehumeral .18-.21, of black humeral .48-.56 mm.

Second lateral thoracic suture with a black line for its whole length, widening into a narrow stripe in the upper two-thirds or three-fourths.

Black on dorsum of abdominal segment nine of uniform width.

Abdomen ♂ 24-26, ♀ 25.5-26.5; hind wing ♂ 15.5-17, ♀ 17-18; costal edge of stigma, front wing, ♂ .49-.56, ♀ .56-.63 mm.

Material examined: Massachusetts, Sherborn, 1897, taken by A. L. Babcock, 3♂. New Jersey, Hammonton, August 23, 1 ♀; Clementon, July 22, 3♂, 1 ♀; May's Landing, August 25, 4♂, 3 ♀ (2 of the ♀ *in cop.*); all in 1899, taken by P. P. Calvert: Manahawkin, Aug. 5, 1912, 1 ♂ taken by H. S. Harbeck.

ON GYNACANTHA EREAGRIS GUNDLACH AND ITS ALLIES

Of the four Cuban species of *Gynacantha* mentioned by Gundlach, *trifida*, *septima*, *gracilis* and *ereagris*, he did not possess *septima*, so that his description thereof is a translation of Hagen's of 1861. His "*gracilis* Burm." = *nervosa* Rambur. A comparison of his own descriptions of the three species which he had, in as far as they include the same parts of the body, gives these differences:

trifida—Head anteriorly greenish, with a [black] T-spot above.

Eyes above obscure blue, below yellowish brown.

Thorax blackish brown, mesothorax with a lateral, longitudinal, wedge-shaped (point toward the head) ray and the sides green, the latter with three blackish brown bands from the base of the wings to that of the legs. [Sides of the mesothorax means here the mesepimeron, metapleuron and part of the mesepisternum.] Metathorax with small green spots arranged thus, 1, 3, 2, 3, 1.

Abdomen: segment one black with two green spots on each side, segment two with the intermedian [mid-dorsal, longitudinal] line and three transverse bands green, following segments black with two small transverse spots at the middle of each segment and two more rounded at the posterior border, the former (not the latter as Gundlach says) almost disappearing on eight and lacking on nine and ten.

nervosa—(♀ only)—Mouth and face very clear olive brown, frons with a blackish brown intermediate [mid-dorsal] line above. [A black T-spot on the

upper surface of the frons is as well developed in both sexes of *nervosa* as in those of *trifida*.]

Eyes above olive green, below clear brown, posterior margin yellow. [The rear of the head immediately posterior to the eyes is blackish superiorly, however.]

Thorax clear ashy reddish (bermejizo-ceniciento-claro), mesothorax above olive with the mid-dorsal sulcus rusty brown. Metathorax with small green, spots arranged thus, 1, 3, 1, 3, 1, sides with four or five small blackish brown spots.

Abdomen clear ashy reddish, segment one with posterior border green, segment two with mid-dorsal line, base on each side and two pairs of small spots above green, following segments similar to two but the mid-dorsal line lacking, nine and ten brown (pardos).

ereagris (cf. *antea*, p. 359)—Labrum and face pale olive straw-color, frons with a black intermediate line above. [A black T-spot on the superior surface of the frons is as well developed in both sexes of *ereagris* as in those of *trifida*.]

Eyes above obscure blue, below clear brown with an olive reflection, part behind the eyes black above, straw-color below.

Mesothorax yellowish green on its anterior border, followed by a transverse blackish band, remainder green, mid-dorsal sulcus and a transverse spot blackish brown. Metathorax black with various small green spots arranged thus, 1, 3, 2, 3, 1 and two others at the base of the wings. [This evidently refers to the metanotum only.]

Abdomen: segment one brown with a transverse posterior green band, segment two also brown with mid-dorsal line and anterior to the posterior border of each piece [*i. e.*, those separated by the supplementary, median, transverse carina] green, three also brown, base and anterior and posterior borders of the second piece of the segment on each side green, following segments black with the green weaker and narrower, last black, posterior border of the first piece somewhat olive green, second piece rust-color.

Trifida, *septima* and *nervosa* are included in the key to the species of *Gynacantha* in the *Biologia Centrali-Americana*,⁶⁷ wherein a number of other characters are employed in distinguishing them. *Ereagris* Gundlach falls under rubric EE of that key, along with *nervosa*, in having the costal margin not more yellowish than the rest of the wing, the metepimeron not bordered posteriorly with blackish. It differs from *nervosa* in having:

The abdomen distinctly constricted at segment three. Segment two of the ♂ is 3.5–3.7 mm. wide at its base (excluding the auricles); segment three is 1.05–1.2 mm. wide at its narrowest part and 2.1–2.24 mm. wide at its hind edge; corresponding figures for the ♀ are 4.13–4.34, 1.47–1.68 and 2.17–2.24 mm.

⁶⁷ Neuroptera, pp. 189–190.

The smaller size: abdomen (excl. apps.) ♂ 43–44.5, ♀ 45–46; sup. apps. ♂ 6, (those of ♀ broken); hind wing ♂ 42–43, ♀ 43–46; costal edge of stigma, front wing, ♂ ♀ 3.5–4 mm.

Fewer cells in the wings: *e. g.*, between the lower branch of Rs and Rspl. at the widest part, three or four (five in one ♀) rows of cells *vs.* five or even six rows in *nervosa*; hind wings between M4 and Mspl. at the widest part three rows, occasionally four (♂) or five (♀), *vs.* four to five rows (or even six in ♀) in *nervosa*.

Differences in the genital armature of the second abdominal segment of the male and of the hind end of the abdomen of the female, which require further explanation.

The genitalia of the second abdominal segment of the males of these four species of *Gynacantha* are in most respects quite similar. In all of them the ventral margins of the tergite of two, seen ventrally, converge from the anterior end of the segment to, or near to, the level of the hind edge of the auricles, thence they diverge more slightly to the hind end of the segment. The extent to which these ventral margins are approximated or divaricated determines, of course, the degree to which the genitalia are visible, especially the posterior hamules. In all four species, the anterior lamina is deeply divided for its whole, or almost its whole length by a deep sulcus. Each half of the lamina bears a well developed spine directed caudad. The anterior hamule has a hamular process and a hamular fold, using Dr. Walker's terms. The hamular process is usually of a darker color than the surrounding parts, is lamellate in form and bent into two parts or branches; the plane of the anterior part is roughly longitudinal and subvertical, that of the posterior part is roughly subvertical and subtransverse (*cf.* plate XXXIV, fig. 34). The hamular fold is visible in ventral view in all four species, lying posterior to the hamular process.

The ligula of Rathke and of Erich Schmidt (sheath of the penis of Rambur and of other writers) bears a long, acute, median keel directed cephalad and appearing, in ventral view, as a spine. Viewed ventrally, the penis being retracted into the genital fossa, the ligula, posterior to the keel, is subequal in width throughout its length in *trifida* and *septima*, while in *ereagris* and *nervosa* it widens markedly caudad (*cf.* plate XXXIV, figs. 31, 32, 34).

Such other differences in the genitalia of these four species which I have detected are as follows:

trifida (Plate XXXIV, fig. 34.)

♂. Ventral margins of tergite of two with no submarginal denticles.

Spines of the anterior lamina reaching caudad beyond the level of the hind edge of the hamular process, in profile view curved so as to be subparallel to the ventral margin of two.

Basal part of anterior hamule extending along the ventral margin of the tergite caudad of the level of the hind edge of the hamular process for a distance equal to about one-half of the distance from that edge to the hind edge of the sternite of one.

Planes of the posterior part of the hamular process caudo-ventral (rather than subvertical) and transverse (rather than subtransverse); mesal angle of the hind edge of the process continued directly on nearly the same horizontal level into the anterior part of the process.

♀. Styles of the genital valves .84-.9 mm. long, nearly as long as the sternite of ten (1.0 mm. on mid-dorsal line). Three spines on the sternite of segment ten, each about .55 mm. long.

Material examined: 8♂, 4♀, all cited in *Biologia Centrali-Americana*.⁶⁸
septima (Plate XXXIV, fig. 33.)

♂. Ventral margins of tergite of two with a submarginal row or cluster of six to eight black denticles which occupy from .7-.76 to .9-.93 of the length of the segment, measuring from the hind edge of the sternite of one, *i. e.*, in the posterior, diverging portion of these margins.

Spines of the anterior lamina reaching caudad beyond the level of the hind edge of the hamular process, in profile view nearly as described for *trifida*.

Basal part of anterior hamule nearly as stated for *trifida*.

Planes of posterior part of hamular process caudo-ventral and latero-ventral; mesal angle of hind edge of process not continued directly into the anterior part of the process but lying somewhat ventral to the place of union.

♀. Styles of genital valves .63-.7 mm. long, distinctly shorter than the tergite of ten (.84-1.0 mm. on mid-dorsal line). Three spines on sternite of ten, .21-.35 mm. long.

Material examined: 3♂, 6♀, all cited in *Biologia Centrali-Americana*, Neuroptera, 192.

nervosa (Plate XXXIV., fig. 32.)

♂. Ventral margins of tergite of two with a submarginal row of nine to thirteen black denticles which extend from .36 or .4 to .67 of the segment's length, *i. e.*, in the anterior, converging portion of these margins.

Spines of anterior lamina variable, reaching caudad not as far as, or beyond, the level of the hind edge of the hamular process, in profile view straight, forming a decided angle with the ventral margin of two.

Basal part of anterior hamule extending etc. for a distance varying from subequal to to about one-half of that from the hind edge of the process to the hind edge of the sternite of one.

Planes of posterior part of hamular process subvertical and transverse; mesal angle of hind edge of process not continued directly into the anterior part but lying much ventrad to the place of union.

♀. Styles of genital valves 1.26-1.5 mm. long, distinctly longer than the

⁶⁸ Neur., 191.

tergite of ten (.9–1.0 mm. on mid-dorsal line). Two spines on sternite of ten, each .7–1.0 mm. long.

Material examined: 5 ♂, 3 ♀, two of the males from Liberia and Surubres in Costa Rica, the other specimens cited in *Biologia Centrali-Americana*.⁶⁹

ereagris (Plate XXXIV, figs. 31, 35–37.)

♂. Ventral margins of tergite of two with a submarginal row of ten to fourteen black denticles which extend from .32–.4 to .66–.7 of the segment's length, *i. e.*, in the *anterior, converging* portion of these margins.

Spines of anterior lamina reaching caudad not as far as the level of the hind edge of the hamular process, in profile view straight, forming an acute angle with the ventral margin of two.

Basal part of anterior hamule extending etc. for a distance subequal to or shorter than that from that edge to the hind margin of the sternite of one.

Planes of posterior part of hamular process subvertical and subtransverse; mesal angle of hind edge of process a little ventral to the place of union with the anterior part.

♀. Styles of genital valves 1.4–1.6 mm. long, distinctly longer than tergite of ten (1.0 mm. on mid-dorsal line). Two spines on sternite of ten, each 1.0 mm. long.

Material examined: 3 ♂, 3 ♀, the same as those listed *antea*, page 359.

EXPLANATION OF PLATES

Plate XXXIII

Figs. 1–4.—Dorsal views of head of males of *Enallagma* spp., to show color patterns, labrum omitted. × 11.8. Zeiss oc. 2, obj. A, lower lens off.

Fig. 1.—*E. truncatum* Gundlach. Cuba, Poey, 1864.

Fig. 2.—*E. pollutum* Hagen. Miami, Florida, March 27, 1901.

Fig. 3.—*E. vesperum* new species. Hurdstown River, Lake Hopatcong, New Jersey, September 6, 1902.

Fig. 4.—*E. laurenti* new species. Enterprise, Florida, April 15. Type.

Figs. 5–7.—Dorsal views of left half of middle and hind prothoracic lobes of *Enallagma* spp., to show color patterns. × 24. Zeiss oc. 4, obj. A, lower lens off.

Fig. 5.—*E. pollutum* Hagen. ♀, Biscayne Bay, Florida, pairing.

Fig. 6.—*E. pollutum* Hagen. ♂, Biscayne Bay, Florida.

Fig. 7.—*E. vesperum* new species. ♀, Pemigewassett Pond, New Hampshire, July 9, 1917; *pit*, pit or fossa.

Figs. 8–11.—Nasus and frons of *Enallagma vesperum* new species. 4 ♂, Black Lake, New York, August 2, 1898, to show color patterns. Same scale and lenses as in figs. 1 to 4.

Figs. 12–23.—Left profile (even numbers) and dorsal (odd numbers) views of terminal abdominal segment and appendages of males of *Enallagma* spp. The broken lines indicate the boundary between the black of the dorsal surface and the pale color of the side. × 28. Zeiss oc. 4, obj. A, lower lens off.

Figs. 12, 13.—*E. truncatum* Gundlach. Cuba, Poey, 1864.

⁶⁹ Neur., 193.

Figs. 14, 15.—*E. signatum* Hagen. Fort Mifflin, Philadelphia, Pennsylvania, July 11, 1891.

Figs. 16–17.—*E. pollutum* Hagen. Florida (Acad. Nat. Sci. Phila.). This specimen was injured after drawings were made from it, but is still preserved.

Figs. 18, 19.—*E. laurenti* new species. Enterprise, Florida, April 15. Type.

Figs. 20, 21.—*E. vesperum* new species. Chemo Stream, Bradley, Maine, July 22, 1891. Type. These are new drawings from the same specimen as that from which figure 27, plate III, volume XX of these Transactions was made.

Figs. 22, 23.—*E. pictum* Morse. Sherborn, Massachusetts, 1897.

Plate XXXIV

Figs. 24–30.—Four left profile (24, 26, 27, 29) and three dorsal (25, 28, 30) views of penis of *Enallagma* spp.

Figs. 24, 25.—*E. truncatum* Gundlach. Cuba, Poey, 1864.

Fig. 26.—*E. pollutum* Hagen. Florida (A. N. S. P.), the same specimen as that from which figs. 16 and 17 were made.

Figs. 27, 28.—*E. laurenti* new species. Enterprise, Florida, April 15. Type.

Figs. 29, 30.—*E. vesperum* new species. Chemo Stream, Bradley, Maine, July 22, 1891. Type.

Figs. 31–34.—Ventral views of the genital fossa of males of *Gynacantha* spp. The broken lines on both sides of each figure indicate the level of the auricles. × 14. Zeiss oc. 2, obj. A, lower lens off.

Fig. 31.—*G. ereagris* Gundlach. (Cuba, “70 ♂” (Mus. Comp. Zool.).

Fig. 32.—*G. nervosa* Rambur. Surubres, Costa Rica, October 16, 1909. The dotted lines show the outlines of the posterior hamules, ligula or sheath of the penis and the glans of the penis in a more widely expanded male from Samana, Hayti (M. C. Z.), which otherwise agrees with the Surubres male.

Fig. 33.—*G. septima* Selys. Cuba, Poey, 1864.

Fig. 34.—*G. trifida* Rambur. Surinam, Thorey. A male from Cuba, Poey, 1858, was compared with this drawing and agrees therewith, but, the margins of the fossa not being as widely open, was not used for figuring.

<i>al</i> , anterior lamina;	<i>hpp</i> , posterior part of the hamular process;
<i>b</i> , basal part of anterior hamule;	
<i>glp</i> , glans of the penis;	<i>lig</i> , ligula (sheath of the penis);
<i>hf</i> , hamular fold;	<i>ph</i> , posterior hamule;
<i>hpa</i> , anterior part of the hamular process;	<i>sp</i> , spine of anterior lamina;
	<i>vp</i> , vesicle of the penis.

Figs. 35, 36.—Left profile and dorsal views of terminal abdominal segments and appendages of *Gynacantha ereagris* Gundlach, ♂, Crooked Island, Bahamas, November 24, 1890. × 6. Zeiss compens. oc. 2, obj. A, lower lens off.

Fig. 37.—Left profile view of terminal abdominal segments of *Gynacantha ereagris* Gundlach, ♀, Santiago, Cuba, September 24, 1903. Same scale and lenses as for figs. 35, 36.

<i>bp</i> , basal plate of ovipositor;	<i>ov</i> , ovipositor;
<i>gv</i> , genital valve;	<i>sty</i> , style of genital valve;
<i>lp</i> , lateral plate of ovipositor;	<i>st</i> , 10, sternite of 10.

Plate XXXV

Figs. 38, 42, 44, 45, *a*, *d*, *p*, terminal abdominal appendages of males of *Enallagma* spp., x 21; 43t, 48t, left side views of prothorax and anterior part of mesothorax of females of *Enallagma* spp. to show color pattern, x 21. All figures with the same Arabic numerals have been drawn from the same individual. In all the figures: *a*, supero-internal view of left superior appendage; *d*, dorsal view of appendages; *p*, left profile view of appendages; *s*, stigma, upper surface of right front wing or lower surface of left front wing, with bounding veins, x 15; *ml*, mesostigmal lamina; *msi*, mesinfraepisternum; *pt*, lateral surface of middle prothoracic lobe. Drawings of stigmata made with Zeiss oc. 3, obj. A, lower lens off, all others with Zeiss oc. 4, obj. A, lower lens off; all with camera lucida.

Fig. 38.—*E. coecum cardenium*, Cuba, [Coll. Needham].

Fig. 39.—*E. coecum cardenium*, Hacienda San Carlos, near Guantanamo, Cuba, May 31, 1914, taken by Dr. C. T. Ramsden [A. N. S. P.].

Fig. 40.—*E. coecum coecum*, Hayti, ex coll. P. R. Uhler, [A. N. S. P.].

Fig. 41.—*E. coecum cardenium*, Biscayne Bay, Florida, taken by Mrs. A. T. Slosson, [A. N. S. P.].

Fig. 42.—*E. coecum cardenium*, Havana, Cuba, no. 4019, taken by C. F. Baker, [A. N. S. P.].

Fig. 43.—*E. coecum cardenium*, Cuba, [Coll. Needham].

Fig. 44.—*E. coecum coecum*, Kingston, Jamaica, [A. N. S. P.].

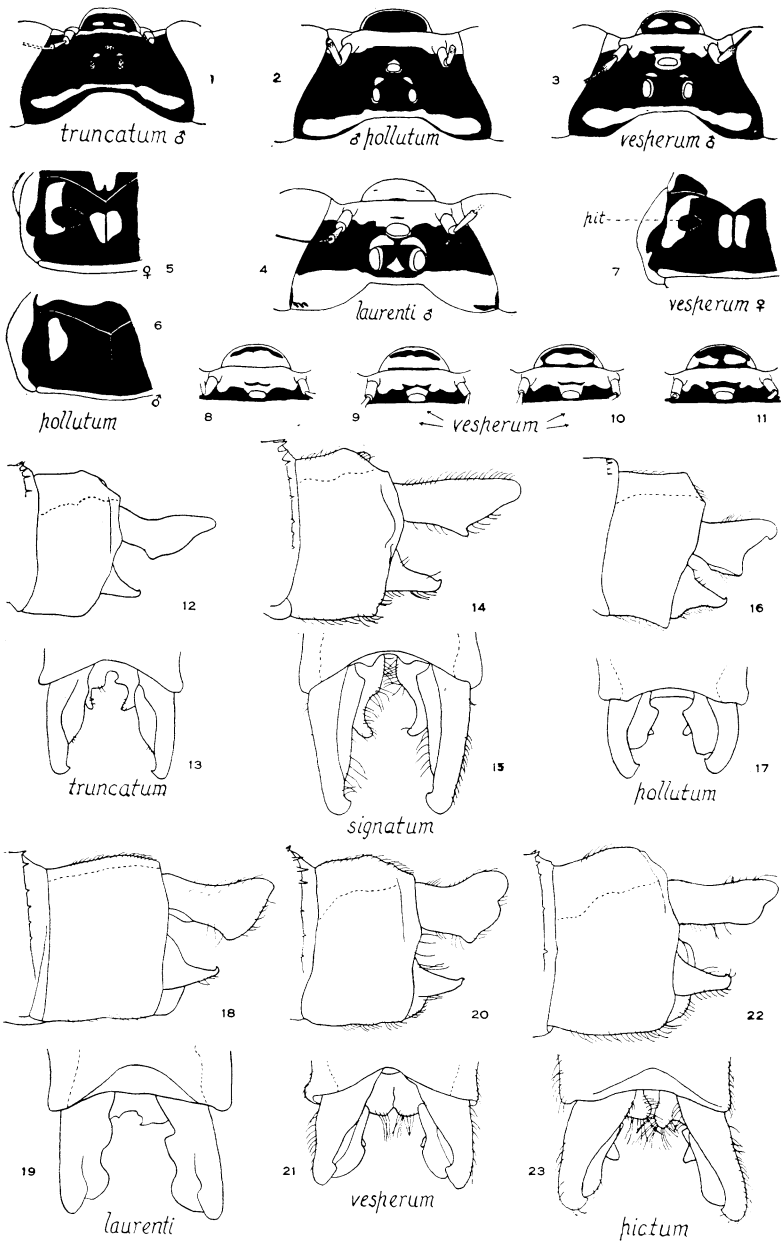
Fig. 45.—*E. coecum coecum*, Kingston, Jamaica, May, 1890, taken by E. M. Aaron, [A. N. S. P.].

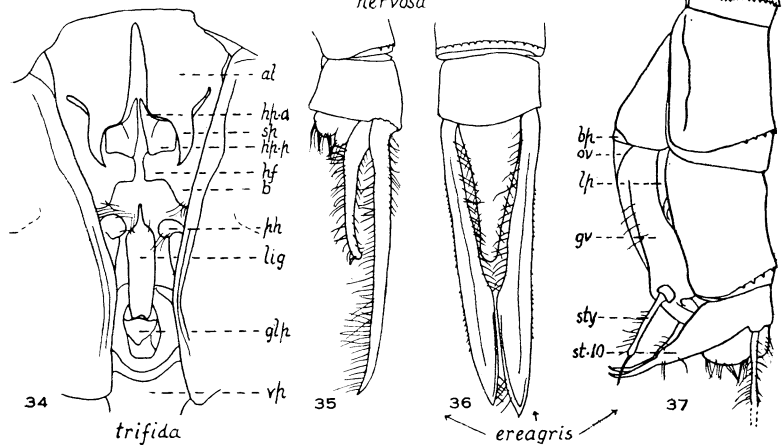
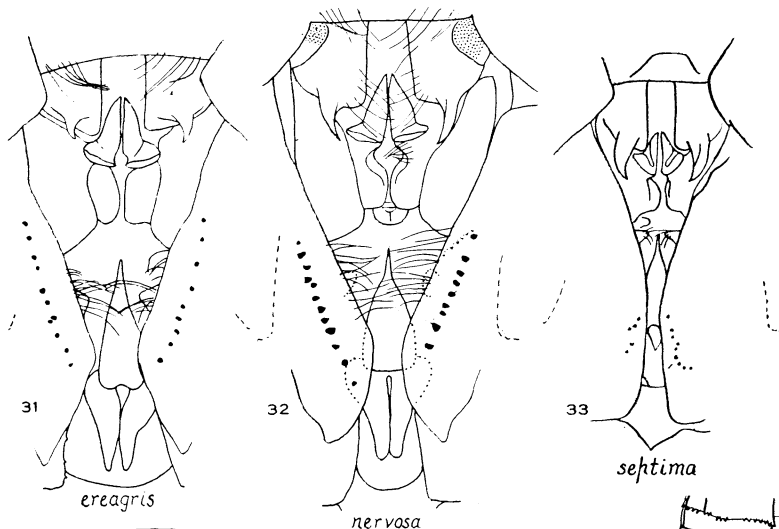
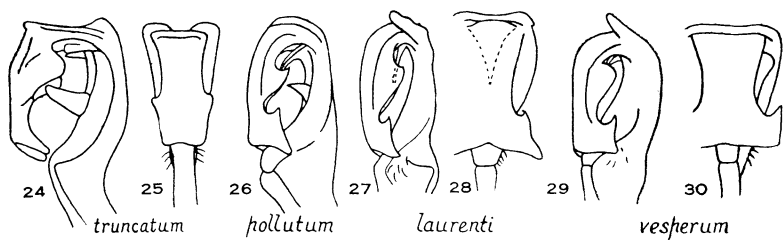
Fig. 46.—*E. coecum cardenium*, Cuba, [Coll. Needham].

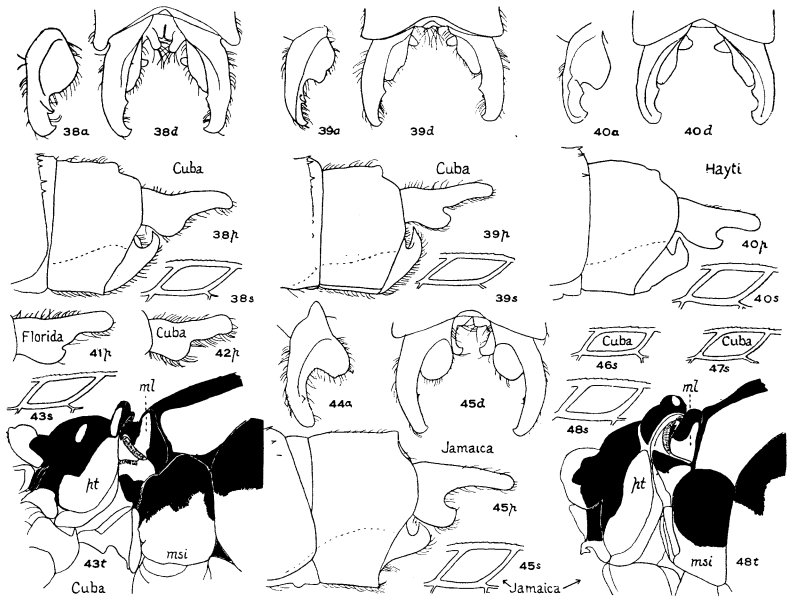
Fig. 47.—*E. coecum cardenium*, Havana, Cuba, no. 4018, taken by C. F. Baker, [A. N. S. P.].

Fig. 48.—*E. coecum coecum*, Kingston, Jamaica, May, 1890, taken by E. M. Aaron, [A. N. S. P.].

Figs. 24–30 are freehand drawings by Mr. C. H. Kennedy; all the others, on all three plates, are camera lucida drawings by P. P. Calvert.







CALVERT—GUNDLACH'S ODONATA OF CUBA

ALPHABETICAL INDEX TO GENERA AND SPECIES

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